THE Chemical Age

VOL. LXXIII 31 DECEMBER 1955 No. 1903

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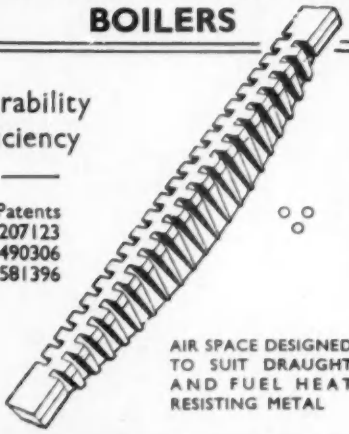

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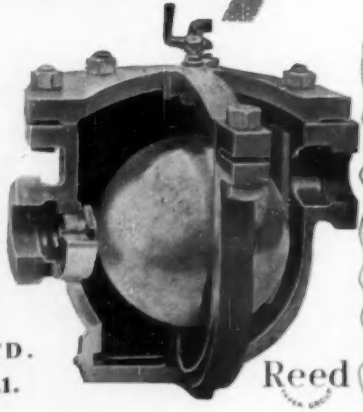

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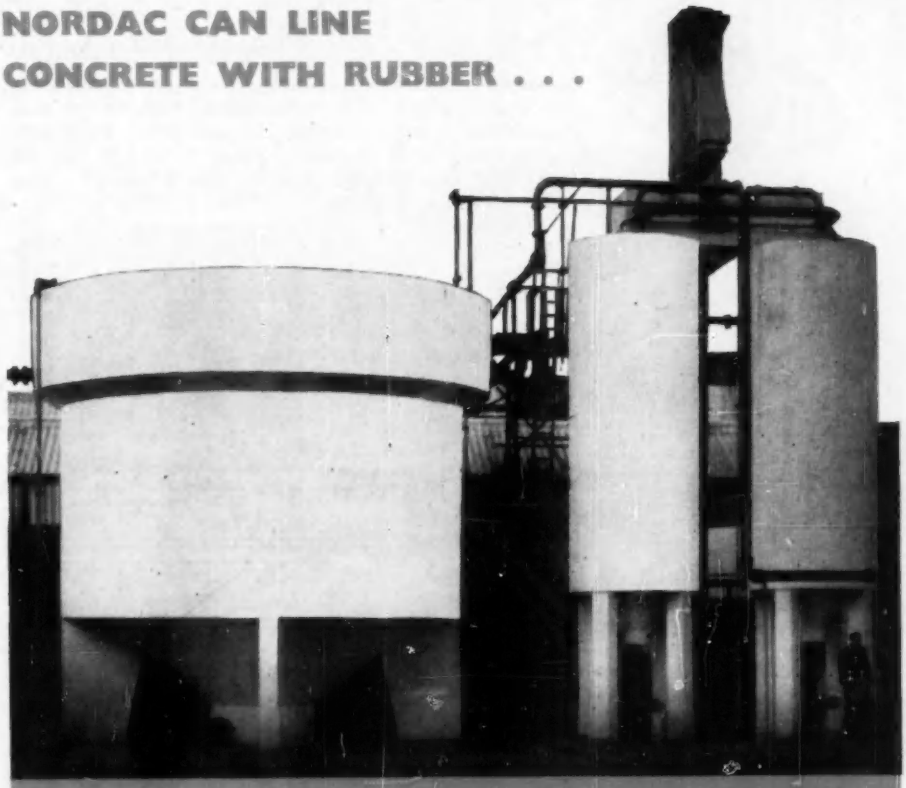

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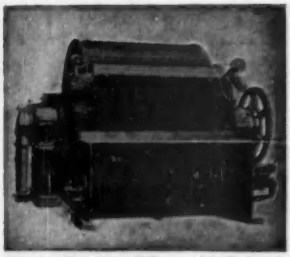

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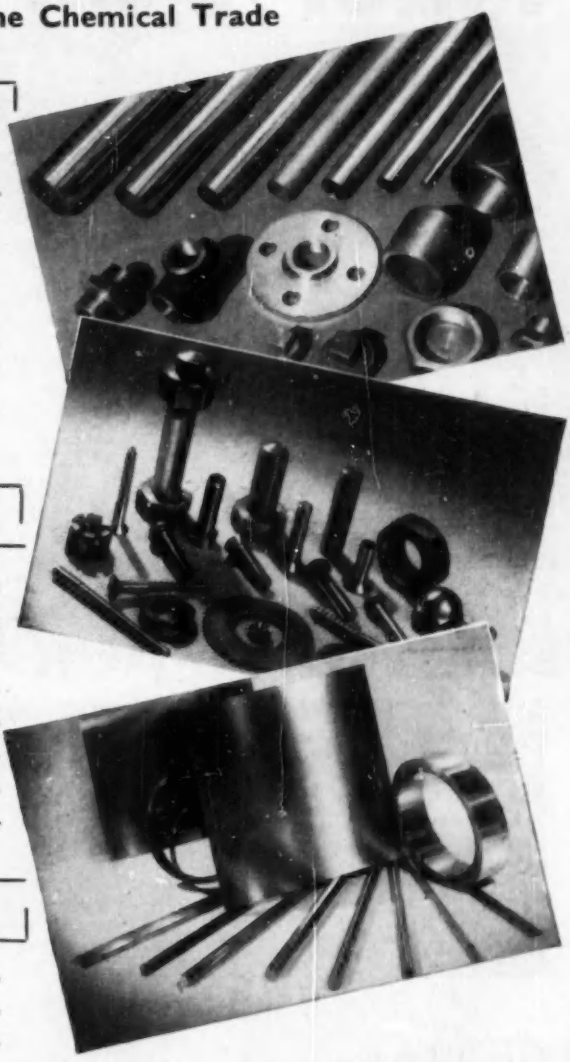

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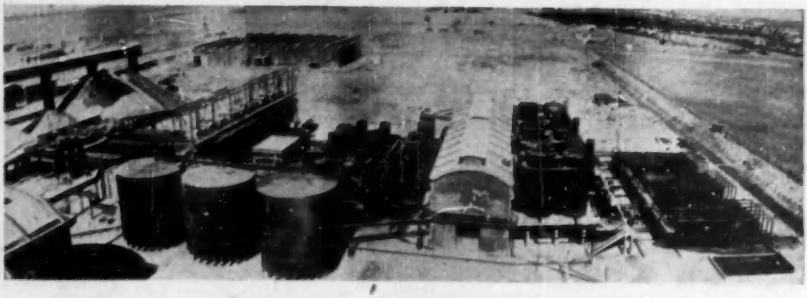

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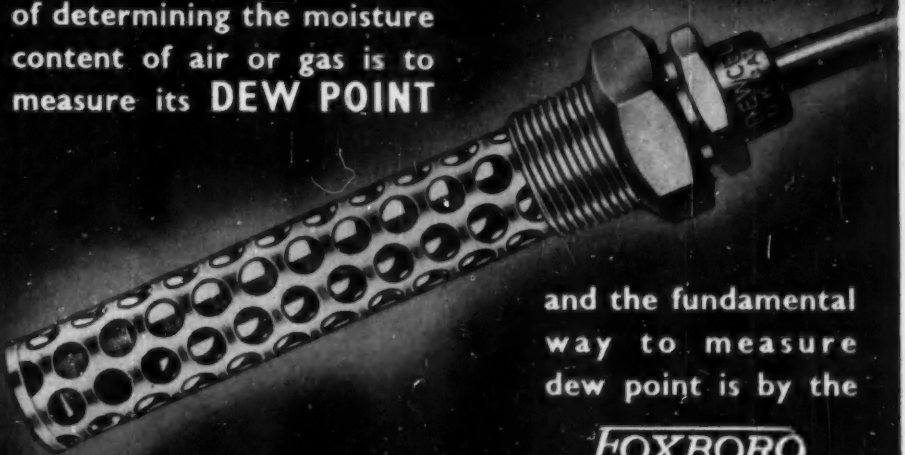

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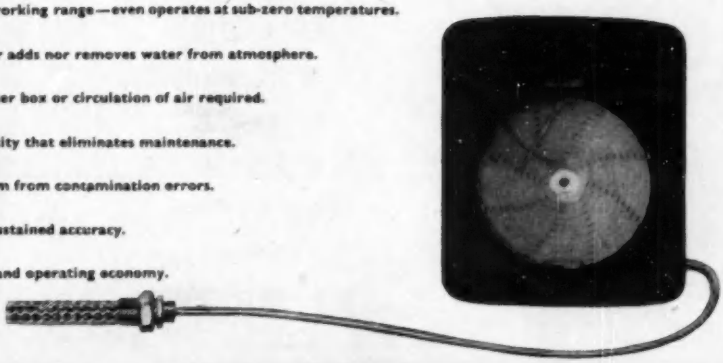

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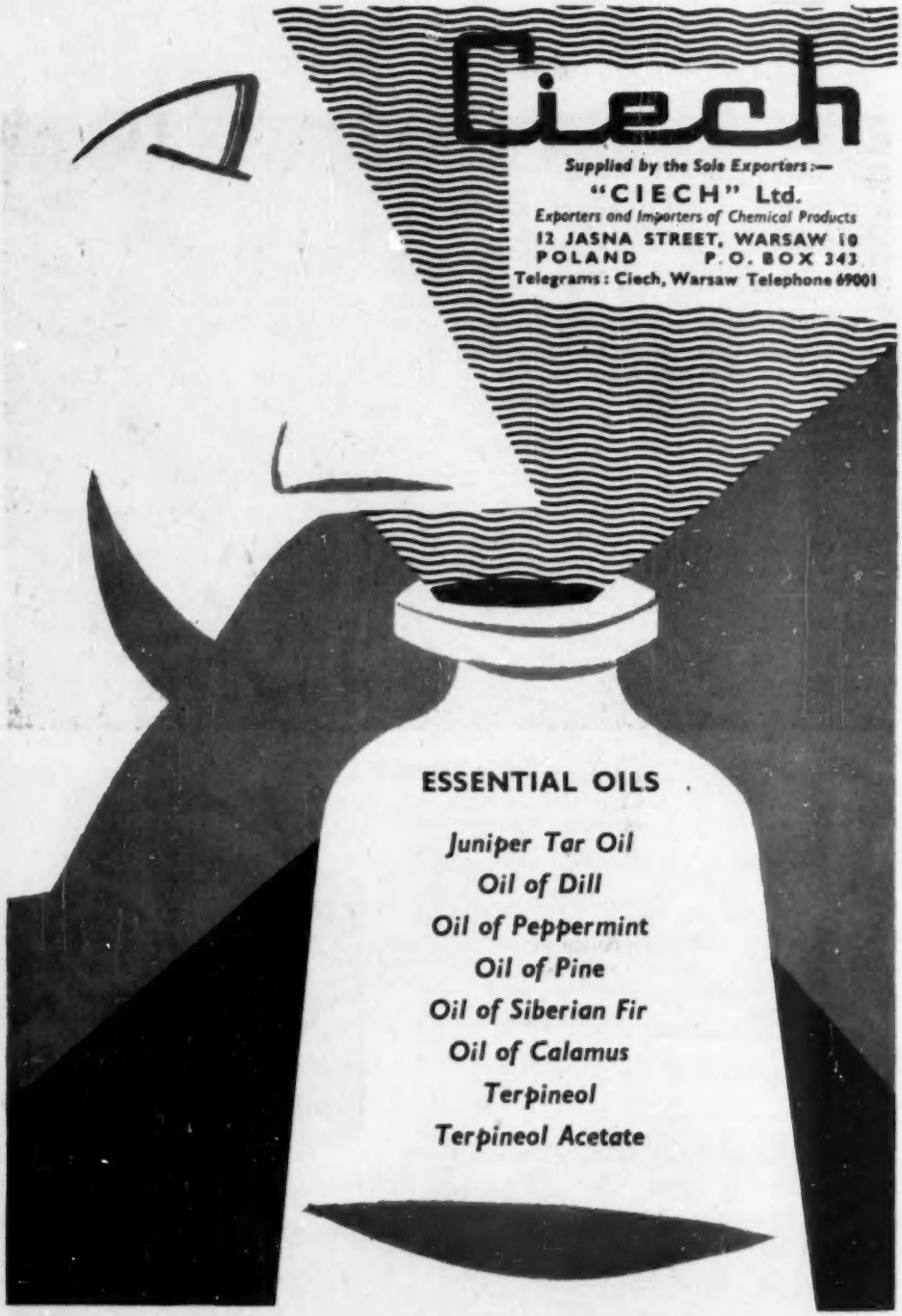
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Volume LXXIII
Number 1903

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Established 1919

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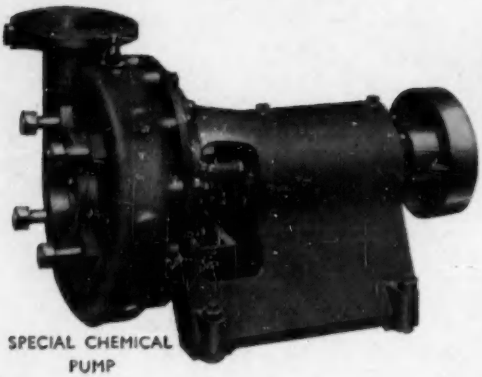

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Retrospect

IN THESE last few hours of 1955 there is more year-end reason than usual to indulge in retrospective thoughts. The year was marked by a general election and two budgets, a year of high summer both for weather and stock exchange but followed in both cases by autumnal reverses. It has been a year of sudden conviviality in East-West contacts, yet a year, too, when sharp evaporation of the Geneva spirit has had, like most evaporations, a sorry temperature-lowering effect. The year has seen Sir Winston's retirement, Clement Attlee's retirement and President Eisenhower's seriously restricting illness. It has been a year of intensified labour troubles, with a docks strike and a rail strike to disperse any soothing influence likely to be offered by comparative and historical statistics. Much has gone on as before, much has gone on better than before and that has been emphatically true of the British chemical industry.

The year 1955 brought numerous expansions of works and several major openings of new works. The first of these in the calendar was the ICI Terylene plant at Wilton, with an initial capacity of 5,000 tons a year, rising swiftly to double this figure. Another important works-birth of the year was the new Pfizer antibiotics fermentation plant at Richborough, Kent, designed for broad spectrum antibiotic production, but mainly intended at present for terramycin manufacture, with a capacity estimated to meet not only all British needs but also much of the sterling area's requirements. Another Anglo-US venture coming into 1955 operation was the Dow polystyrene plant at Barry, South Wales, described (not without a touch of secrecy) as the most modern plant of its kind in the world. It is likely to end importation of polystyrene.

The Solway Chemicals sulphuric acid plant at Whitehaven might also be listed as a 1955 birth for it has got into working stride during this year and received exceptional publicity from the official visit by HRH the Duke of Edinburgh. This anhydrite venture can turn out 100,000 tons of acid per year; though at present the market does not encourage anything like this maximum production. The reverse of fortune in the world sulphur situation has not assisted this project's immediate prospects, but time and events may well be heavily on its side. Nationally, we may be wrong in re-encouraging acid production from any imported material unless all works that can produce acid from home-based materials are first of all operating at full output.

However, as this last example has to some extent shown, 1955 plant events may be a truer token of past confidence in the future than of contemporary confidence. The plant of this year began as a blue print several years ago and the point of no return in its construction will have been reached and passed in 1953 or 1954. But 1955 has brought some notable announcements of new projects of the future. Outstanding, perhaps, is the new Dunlop-led rubber company venture to make synthetic rubber here, which we discussed only a week or two ago (THE CHEMICAL AGE, 1955, **73**, 1263). No less technically intriguing is the dual Fisons-Shell venture in Thames estuary, extracting nitrogen from oil refinery gases and converting it into fertilizers, a project totally involving an expendiure of some £11,000,000. If the Shell part of the plans has been made fairly clear, the Fisons' part has given rise to plenty of speculation. Judging from the inquiries that followed our reports of this project back

in November, there is a widespread desire to obtain more detailed information.

Research, the key and lock of chemical progress, has enjoyed one of its happier post-war years. A statement pledging both maintenance and expansion for official research was made by the Prime Minister during the early period of second-budget speculation, and nothing since has suggested that the DSIR network or similar State research organizations will have to endure cuts and postponements as was the case four or five years ago. No less should have been expected; for with research only lately emerging from the effects of former crisis-economy, further cuts would have been unkindest of all. The Water Pollution Research Laboratory's new buildings at Stevenage were opened during the year; the British Rayon Research Association's first permanent station was also a 1955 'birth'; and the formation of the Chalk, Lime, and Allied Industries' Research Association has been welcomed. In general, a wider and deeper appreciation that research is an essential investment and not an optional speculation has been observable during the year. Britain is becoming more scientifically-minded—even the more insular sectors of resistance are weakening.

A not unexpected disappointment of the year was the withdrawal, first by ICI and then later by Fisons, from developing the extensive Yorkshire potash deposits. As was feared from the start, the wealth of potash that is there is placed too deeply. That this valuable natural resource will one day be developed seems beyond doubt—we possess no potash and we need huge quantities for our crops. But what seems almost certainly the most interesting technical conundrum of the year is the low pressure polythene gambit with its various processes. Here in the mother-country of polythene, where the original patent for the high pressure process is soon expiring, any plans to develop the new process are hidden in a fog of rumour and mystery. It is not so in other countries; firms which have made licence arrangements to use a low pressure process have announced their intentions.

There have been two major take-over deals. The Shell adoption of Petrochemicals Ltd. was a bold and generally commendable step. The Petrochemicals story was a troubled but valiant one; the high costs of pioneering new fields of long-term success have proved too burdensome for smaller units before. Foster-parentage by Shell seems likely to speed the progress of the British chemicals-from-oil industry. Later in the year Albright and Wilson's acquisition of Marchon Products Ltd. became known; here a natural merging of phosphorus and phosphate interests and the compounding of a long-established company with a youthful and vigorous one should bring many increases in fertility. If these two take-over deals can be looked upon as happy events in the chemical industry, it is equally true to say that another much-discussed take-over deal of the year would have been an unhappy event had it taken place. However, British borax interests remained British despite what seem to have been excessively tempting American offers. On the other hand, several of the big American chemical companies appear to be planning either to invade the British field for the first time or to greatly expand their activities here. Olin-Mathieson have just recently formed a British subsidiary company (see page 1402 of this issue) and it is expected that within not very many months they will announce important plans. There are also rumours that the greatest of all chemical manufacturing companies, Du Pont de Nemours, are at the moment laying plans for increasing their activities in Europe in general, and the UK in particular. Usually well-informed people are predicting that Du Pont may someday establish manufacturing facilities in this country.

The year ending has been a very interesting time for the British chemical industry. In every direction—research, production and sales—the industry has made some progress. It is doubtful whether any other industry can look back on the past 12 months with such a feeling of satisfaction or look forward with such confidence. The industry realises that competition in its export markets will certainly increase, but is determined to hold its own if not improve upon its present position.

Notes & Comments

Nature Excelled?

ONE chemical event of 1955 has been the relegation of the chicken's egg's shell. It no longer matters—even for retail cross-counter trading. Such is the march of progress in modern packaging with synthetics that Nature's outstanding self-packaging effort has been demoted. In Ithaca, New York State, de-shelled eggs are being sold in 12-section polythene containers. This is *not* just a novelty item. Eggs are mechanically de-shelled, the contents passed into the polythene compartments; a second machine seals the compartments. Before this happens air in the compartments has been pressure-displaced by carbon dioxide. The carbon dioxide retards spoilage developments. The polythene walls holding the de-shelled egg are much less porous than natural shell walls; moisture loss is reduced, the risk of bacterial infection much lessened. Size-grading is removed as a marketing task; small eggs, when de-shelled, can be used as two-in-one double yolk occupants of a single polythene compartment. Eggs can be cooked in the containers for any task that shelled eggs are normally used for today. The polythene would not stand frying temperatures, but de-shelled eggs are used for frying anyway. There seem to be a good many technical arguments in favour of this development. It also seems economically attractive. Eggs packed this way are actually being sold cheaper than shelled eggs! Perhaps the time is fast coming when the breakfast egg devotee will sigh reminiscently and say, 'that's shell, that was'!

Student Shortage Too?

WE had hardly completed our article last week on the 'supply of boffins' and the teacher-supply bottleneck when we came across the US Manufacturing Chemists' Association's latest news-sheet, the October-November issue of *Chemical News*. The main article quotes some forthright comment by a college chemistry teacher and it would seem that in the US student shortages are as common as science teacher shortages. Youngsters today regard chemistry as a much too formidable subject. Textbooks of 850 or 1,000 pages are frightening. The student mortality in chemistry courses is high, and average students enrol for courses in simpler subjects. The case of one college is mentioned. Out of 1,900 students including 550 freshers, the physics professor has 14 students, four of whom were freshmen. Chemistry sections for several years have been under 30 or 35 in number.

UK Picture Different

IS there similar evidence of a student reaction against chemistry, physics, and mathematics here? It may well be obviated by the fuller attention given to scientific subjects in our schools (when they have teachers to teach at all); US policy has always left more of the basic work to the university curricula, and nowadays the natural enlargement of the subjects themselves may have overburdened the university portion of training. It is still true to say here that students from good scientific schools have very easy first years at any of our universities—their senior school work has covered 60 to 75 per cent of the junior university work. However, this was a good deal truer 20 and 30 years ago since now teaching deficiencies have reduced the number of schools that can be described as good scientific establishments.

The Editor and Staff of THE CHEMICAL AGE would like to take this opportunity to thank the many kind people in the British and overseas chemical industries who sent them cards or some other form of greeting at Christmas. The kindness shown to us, not only at Christmastide but throughout the whole year, has been greatly appreciated.

The 1956 CAYB

Year Book More Useful Than Ever

THE 1956 edition of THE CHEMICAL AGE YEAR BOOK contains many new and revised features as a result of the numerous suggestions received from our readers. This edition is undoubtedly of greater value and interest to the industrial chemist and chemical engineer than any of our previous editions. New features include a list of all the factory inspectorate districts with the names, addresses and telephone numbers of district inspectors, a list of the names, addresses and telephone numbers of chairmen and chief officers of river boards and catchment boards, and a list of over 300 chemical and metallurgical journals.

At the request of readers the table of 'International Atomic Weights, 1953,' has been re-instated. A completely revised guide to chemical literature, including books published up to the beginning of June 1955, has been arranged according to the Universal Decimal Classification. This guide gives the title, author, publisher, date and price of each book. Addresses of the principal publishers whose books are listed are also given.

A useful section, 'Physico-Chemical Tables,' is again included. Two new items are the 'E-Mil' temperature conversion table and the 'E-Mil' hydrometer conversion table.

Over 137 chemical and allied organizations are listed, giving all main groups and local sections together with the names and addresses of honorary officers and officials. As in previous editions, research stations and laboratories of DSIR are listed, together with names, addresses and telephone numbers. There is also, as usual, a list of research associations

Another new section is a list of agricultural research institutes and units under direct control of the Agricultural Research Council, together with a list of all agricultural advisory centres. This section also gives names, addresses and telephone numbers of officials.

A particularly valuable section, 'Administrative Groups Concerned with Chemical Industry,' is again included. The 'Who's Who' section is twice as large as last year. 'The Buyers' Guide' is also larger than ever before. Every entry in the book is as accurate and up to date as is possible in a work of this nature.

Subscribers to THE CHEMICAL AGE will shortly be receiving their free copies of this valuable annual. For those who require them, additional copies can be obtained from the publisher, 154 Fleet Street, London EC4, price 21s.

Olin Mathieson, Ltd.

ON 3 December it was exclusively reported in THE CHEMICAL AGE (p. 1214) that Olin Mathieson Chemical Corporation, the giant American chemical company, was planning to establish a British subsidiary. On 12 December a new company, Olin Mathieson Ltd., was registered in London with a capital of £30,000 in £1 shares and with registered offices at 17-18, Old Bond Street, London W1.

The declared objects of the new company are: 'To carry on the business of chemists, importers, exporters, manufacturers of and dealers in chemical, industrial and other substances, products, preparations or articles etc.'

The directors are John R. Robinson, MP, director of British Guiana Consolidated Goldfields Ltd.; Charles S. Dennison, managing director of E. R. Squibs & Sons, Ltd.; Thomas S. Nichols, president of Olin Mathieson Chemical Corporation of Maryland, US and Stanley de Jongh Osborne, executive vice-president of Olin Mathieson Chemical Corporation, Connecticut, US.

UK Plastics for US

A TYPE of flexible piping suitable for special purposes in rocket propulsion, which is unobtainable in the US, was recently produced in a matter of hours by Creators Ltd. of Woking, Surrey, and shipped by air to America. The material needed was an extremely flexible type of piping which would be resistant to most types of corrosive acids and which could be twisted and bent without reducing the internal bore. After an exchange of priority cables between Britain and the US, quantities of ¼-in. bore Armourvin, a special type of pvc covered steel spring industrial tubing in uninterrupted lengths manufactured exclusively by Creators Ltd., were on their way to America.

German Chemical Imports Increase

'Liberalization' Policy Causing Concern

AFTER several years in which the West German chemical industry advanced faster than other industries, figures for the first nine months of 1955 suggest that chemical manufacturers are now for the first time lagging behind others in output expansion. Chemical production during January-September advanced by 10.2 per cent (by volume) compared with 16.1 per cent in 1954, and total industrial production by 18.5 per cent against 22.3 per cent. Chemical sales rose by 14.4 per cent to DM 10,400,000,000 and total industrial sales by 18.6 per cent to DM120,700,000,000 in January-September, 1955.

Imports of chemical raw materials and products, on the other hand, rose by close on 40 per cent to DM884,000,000, i.e. 36 per cent of chemical exports from the Federal Republic against 27 per cent in the average of 1954. The rapid advance of imports is causing some concern to German chemical producers. While it is agreed that part of the increase is due to shortage of plant capacity in certain sections of the industry, its main reason is believed to be the liberalization policy which the Federal Government pursues vigorously in order to keep domestic prices down. Imports of industrial chemicals and dyestuffs have risen most steeply. West German manufacturers argue that lowering of customs duties and the proposed suspension of export promotion measures are likely to result in a further shift in foreign trade in favour of imports.

Höchst's New Purchase

Farbwerke Höchst AG has taken over Anorgana GmbH, a former IG Farbenindustrie subsidiary which after the war was for some time owned by the Bavarian State and later purchased by a banking group. Months ago it was reported that Farbwerke Höchst AG intended to take over Anorgana GmbH as soon as Allied decentralization legislation lapsed, but it was denied at the time that such a step was envisaged. The purchase has now been officially announced. The Anorgana factory at Gendorf, Bavaria, is to retain its production range within the Höchst combine, and sales will be handled by a special marketing organization.

Farbwerke Höchst AG at the beginning of this month extended its production and sales interests in another direction. Under an agreement with Rheinpreussen AG für Bergbau und Chemie, Homberg, Farbwerke Höchst AG has taken over the production and distribution of pharmaceutical products developed by Rheinpreussen. On the part of the latter company the decision to desist from introducing these products itself is explained as being due to the existing sharp competition in the German and international pharmaceutical market. Patents and processes have been handed over to Höchst because it is considered doubtful whether the big investments required would have been justified in the long run.

Bayer's Figures

Farbenfabriken Bayer AG, Germany's largest chemical enterprise, is the first one to publish figures for the whole of 1955. Total sales will exceed DM1,400,000,000, this year, against DM1,200,000,000, and profits will permit a repetition of last year's dividend of eight per cent on the capital of DM 387,700,000. Capital expenditure has risen to DM210,000,000, compared with DM 185,800,000 in 1954, and research expenditure to DM61,000,000, compared with DM 50,000,000. The present production capacity of the Bayer factories is stated to be 2½ times that of 1938. Plant modernization is expected to be completed by 1957/58.

While the Bayer management shows some reticence as regards its plans for further capital expenditure in new installations, it indicates the main directions of its research effort. In the dyestuffs field new opportunities are looked for among new fibres. Considerable attention is to be devoted to agricultural chemicals. The company is also taking great interest in nuclear chemistry. An isotope laboratory described as probably the most modern and comprehensive of its kind in Germany has been opened at Elberfeld.

In industrial operations the company makes full use of automation. A number of new installations—e.g., for acrylonitrile, polyurethane plastics and phthalic acid—are operated and supervised by two or three men. Bayer exports are expected to exceed

DM 500,000,000 in 1955, which suggests an increase in foreign sales of similar proportions as home sales; over half the output of dyestuffs and plant protection chemicals is now going abroad.

Capital expenditure totalling DM 30,000,000 is envisaged by Knapsack-Griesheim AG, West Germany's only producer of phosphorus. The output which will be between 9,000 and 10,000 tons this year is far from adequate to meet the growing demands of the detergent industry. The capacity is to be raised to up to 35,000 tons to enable the company—from the middle of 1956 onwards—to cover all domestic requirements. The carbide installations are also to be extended.

Temperature Control

New Fielden Precision Thermostat

THE latest model electronic precision thermostat introduced by Fielden Electronics Ltd., Wythenshawe, Manchester, was shown to the Press at the London Club, on 16 December. The original instrument was designed by Fielden engineers for use in their own development department for applications calling for abnormally high sensitivity and accuracy combined with long-term stability.

The New Fielden Electronic Thermostat

As it was found that the instrument did in fact set a new standard in precise temperature control, it was later drawn-up for works production. In its present form—a die-cast aluminium case 6¼ in. by 7¼ in. by 4½ in.—it has suffered no loss in performance and constitutes an extremely compact and robust piece of equipment suitable for use in industrial locations as well as research laboratories etc.

Temperature Sensing

As the temperature sensing element, a high-grade rapid response resistance bulb is used. This forms one arm of an AC bridge, the out-of-balance of which is amplified by a high-gain, phase sensitive amplifier, and the output from this operates a relay.

The setting-up consists, merely, of connecting to AC mains and turning the calibrated dial on the front of the instrument to the desired temperature. No further attention is necessary, unless it is required to alter the control point, and a change of 0.1°C either side of the pre-set temperature value on a 100°C range is sufficient to operate the relay for alarm or control action. Two coloured indicating lamps are fitted on the front of the case.

The instrument is being marketed in 10 standard ranges up to 500°C or 932°F and the incorporated relay is rated at 5 amps 250 volts 50 cycles non-inductive load or 250 volts 1 amp DC.

The Fielden electronic precision thermostats are said to be finding increasing favour among Government establishments, universities and technical institutes, industrial research organization and hospitals and leading concerns in the chemical, oil, plastic, paint, food, electrical and other industries.

Fieldens have recently adopted the slogan 'We are still British and proud of it' in view of the fact that they are now one of the two electronics instruments manufacturers in the UK who are not controlled by foreign interests.

Oil Strike in Egypt

The National Petroleum Co. has announced that it has made a new oil strike in the Balam area on the Sinai coast of the Gulf of Suez. The new well has an estimated output of 100 tons daily.

Manufacture of Resins & Moulding Powders

by A. G. THOMSON

SITUATED near Barry, in South Wales, nine miles from Cardiff, are the Sully factories of the plastics companies within The Distillers Company Industrial Group. These are British Resin Products Ltd., British Geon Ltd., a company jointly owned by The Distillers Company and B.F. Goodrich & Co., and Distrene Ltd. in which The Distillers Company are associated with the Dow Chemical Company in the manufacture of Styron polystyrene in a plant which has only recently come into production.

The original site is about 56 acres of which some 50 acres are at present being used. It is currently being extended to 93 acres to meet the requirements of future expansions. All three factories have a common administration and extensive research and development laboratories provide facilities which are also shared.

While British Geon Ltd. and Distrene Ltd. are concerned with the manufacture of specific types of plastics raw material, i.e. polyvinyl chloride and polystyrene respectively, British Resin Products Ltd. produces a wide range of synthetic resins and plastics raw materials and has pioneered the manufacture of a number of important materials in the United Kingdom. These include polystyrene, cellulose acetate moulding powders, polyvinyl chloride and cashew liquid derivatives.

It is with British Resin Products Ltd. that this article is concerned. The output of this company is utilized by numerous industries to produce adhesives for wood and metal, moulded articles, paint, brake linings, laminated boards, sand cores and shell mouldings for foundries, chemical resisting cements and many highly specialized products. The materials produced at this factory fall broadly into four classifications; spirit soluble or low temperature resins, oil soluble or high temperature resins, thermosetting moulding powders and thermoplastic moulding powders. Production is similarly classified and there is a production building for each of the four categories.

Buildings Independent

In many ways these buildings function independently of one another and each has its own force of workmen skilled in the handling of their particular products. All four buildings, however, are controlled by one production manager and certain factory services such as general works management, personnel management and engineering are common to all. A feature of the BRP fac-

General view of the BRP Research Block

tory is the high degree of mechanization achieved in certain sections.

HIGH TEMPERATURE RESINS

A four storey building is devoted to the production of resins for which relatively high temperature processes—up to 275°C—are necessary. Quantitatively, its most important products are Epok alkyd resins and modified phenolic resins, both of which find their largest outlet to the paint industry. Cellobond polyester resins and cashew resins together with Epok coumarone resins are also made in the same building.

Epok alkyd resins are used primarily by the paint industry in the formulation of many types of decorative and industrial paints. In decorative paints, the alkyd functions as the paint medium and is usually based on a drying oil, linseed oil being the most widely used. Alkyds for industrial paints are often used as plasticizers for urea and melamine resins and are themselves non-drying. Other important constituents of alkyd resins include a polybasic acid such as phthalic anhydride and a polyhydric alcohol such as glycerol or pentaerythritol. Esterification and ester interchange are the main chemical reactions involved in the manufacture of alkyd resins.

A view of the BRP factory

Most of the raw materials used are received by road tankers which off-load at the tank farm adjacent to the main building. From this point, raw materials are pumped to storage tanks at the top of the building and are subsequently discharged through weigh tanks into stainless steel kettles on the floor below. Each kettle has a capacity of 1,000 gallons and is an independent manufacturing unit. The kettles are oil heated and ancillary equipment for each includes a multi-tubular condenser, healing and cooling coils and automatically controlled furnace fired by producer gas.

The rate of heat input is controlled by the oil temperature and this process is fully automatic, no furnace operator being required. The reaction temperature is pre-set on a special temperature recorder and when the batch temperature reaches this figure the oil temperature controller maintains these conditions by closing the control valve. When the temperature drops the valve opens and the oil is heated again. Elaborate precautions safeguard against the effect of breakdown. If the flow of oil ceases or the motors fail, a signal light is illuminated, an audible warning is given and the supply of gas is cut off. The furnace room is situated on the ground floor, remote from the reaction kettles and other manufacturing equipment.

Azeotropic Distillation

An interesting feature of BRP alkyd manufacture is the use of azeotropic distillation to remove water formed during esterification. British Resin Products Ltd. was probably the first major producer to speed up manufacture by using this process on a commercial scale. The water is removed, not by vacuum or thermal distillation as in conventional practice, but by entrainment with a solvent having a vapour pressure lower than that of water. The condensed water and solvent pass from the multi-tubular condenser to a column separator where the water is discharged from the bottom and the solvent recycled to the kettle.

When manufacture is complete, the batch of alkyd is discharged by gravity into a mixing tank containing solvent. This vessel is equipped with both a stirrer and a mixing pump and homogeneity can be quickly

achieved. Any solvent adjustment necessary to bring the batch within specification is made in this tank. The resin solution is then clarified by filtering and pumped to a storage tank ready for shipment either by road tanker or in drums.

Basic Raw Material

Epok modified phenolic resins are general purpose varnish resins for use with linseed, tung and similar drying oils in the manufacture of media suitable for both industrial and decorative paints. The basic raw material is rosin, the properties of which are upgraded by admixture with phenolic intermediates and by esterification. In its natural form rosin is too acid for use in paint and has a low melting point. The melting point is increased by adding a phenolic resole based on diphenylolpropane, *p*-tertiary butyl phenol or similar *para* substituted phenols. These resoles are prepared by condensation with formaldehyde using caustic soda as a catalyst. The acid value is reduced by esterification with glycerol or pentaerythritol.

The kettles used for the production of modified phenolic resins are 1,000 gallon stainless steel vessels similar to the alkyd vessels but having neither heating nor cooling coils. Agitation is achieved by means of a special stirrer revolving at 30 to 40 rpm.

Modified phenolic resins are usually sold in the solid state. When manufacture is complete, the batch is discharged by gravity through a stainless steel gauze on to a metal cooling floor where it is allowed to cool and harden. The solid resin is then broken up, bagged and palleted ready for despatch.

Cellobond polyester resins reinforced with glass fibre are widely used in the production of low pressure laminates where a high strength/weight ratio is required.

Alkyd Resins

Plant similar to that for alkyd resins is used to prepare polyester resins and there is some similarity between the processes employed. One difference lies in the fact that a degree of unsaturation is essential either in the acid or the glycol used. This is necessary to permit cross linking when using the resin in the manufacture of laminates. An unsaturated acid such as maleic, modified with phthalic, adipic or sebacic acid is condensed with a glycol such as diethylene glycol or ethylene glycol. A long chain polyester with many unsaturated links is finally obtained.

Styrene is commonly used to cross link the resin, and styrene monomer is often employed as a solvent for the resin, thus facilitating handling. Such solutions must however be prepared without the application of heat and in the presence of an inhibitor, otherwise premature copolymerization will occur. The user adds a catalyst which on the application of heat will initiate polymerization. If required, an accelerator may be added as well to enable the polymerization to proceed without the application of heat.

Yet another section of this building is used in the production of Cellobond cashew resins, the bulk of which are used in brake linings.

Shipped by Tanker

The crude black cashew nutshell liquid is shipped to England by tanker which discharges into storage tanks at Barry docks. A road tanker then delivers it to 10,000 gallon tanks at the factory. The liquid is first refined, after which it may be both polymerized and condensed with an aldehyde. Three polymerizers have been installed; a large one which supplies polymer to the finishing plant, and two of lesser capacity which are used for smaller batches sold direct to customers for a variety of end uses.

Curing of the polymer in the presence of an aldehyde is achieved by oven baking the polymer in paper lined trays. The thermosetting reaction is completed in 16-24 hours using a fairly high temperature. The temperature drop through the oven, which is heated by hot air, is 70°C. Air entering the furnace passes through a heater and is drawn up the outlet stack. The temperature is automatically regulated by a control valve on the feed to the heater. Since the curing action tends to be exothermic with an attendant fire risk, the controller automatically shuts off the heating medium and rings an alarm bell if the temperature exceeds a pre-set value. The cured resin is then cooled, ground and sifted, and the sifted product blended and packed in drums.

Associated with the crushing and grinding mills are cyclones and dust collection equipment, a practice standard throughout

the factory wherever processes give rise to dust.

LOW TEMPERATURE RESINS

In the second resin building, the bulk of the output is composed of amino and phenolic resins produced by processes employing steam heating.

Amino resins are among the most versatile resins known and are used in industry for a wide variety of applications. Cellobond urea resins are employed by the woodworking industries as general purpose adhesives, and in foundry work they are used as binder resins for sand cores. Epok urea and melamine resins are the basis of many industrial paints in which they are used in conjunction with a plasticizing alkyd resin.

Amino resins are colourless, have good resistance to moisture and bacteriological attack, and they will withstand high temperatures. Resistance to weather exposure, particularly of the adhesive type, is limited and the use of phenolic adhesives as exterior adhesives is preferable.

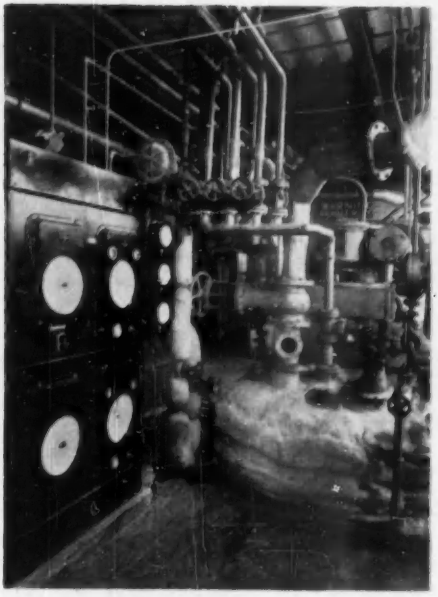
Only four types of amino resins are marketed by BRP and these are produced on a scale which allows fully automatic processes to be used.

In a typical process such as that used for Cellobond U8660, an adhesive resin, urea is condensed with formaldehyde under alkaline conditions. Subsequent resinification is carried out at a lower *p*H value and when this reaction has reached the desired end point the batch is neutralized, and the excess water removed, leaving a liquid product having a viscosity of 30 to 40 poises at 25°C.

Distillation Equipment

Several stainless steel vessels each of 1,500 gallons capacity are used for the production of urea resins. Each is jacketed in two sections, both of which can be used either for steam heating or water cooling. The distillation equipment ancillary to each vessel is designed for both straight distillation and entrainment distillation. Reaction times and temperatures are pre-set on a Bristol controller, and all that is required of the operator is to sample the batch at predetermined times for laboratory running tests.

Many types of phenolic resin are produced in this section of the building. Cellobond resins are used as adhesives by the wood working and metal industries, as laminating resins in the manufacture of laminated boards and compregnated wood, as binder resin in brake linings, grinding wheels and in the preparation of shell mouldings for foundry work. Epok resin of both the spirit soluble and oil soluble types are used extensively in the preparation of special types of paint and varnish. A third type of phenolic resin is made as a works intermediate for use in Rockite moulding powders which are described later.



Part of the plant used in the manufacture of BRP's urea resins

Phenolic resins are made in equipment similar to that used for urea resins and the manufacturing processes are basically similar, but the application of automation techniques is limited by the large variety of types produced.

The base raw material is a phenolic body: phenol, a substituted phenol, one of the cresols and sometimes cardanol derived from cashew nutshell liquid. This phenolic body is condensed with formaldehyde in the presence of a catalyst under specified conditions which vary according to the type of resin being made. When condensation has reached the required end point, water is

removed by distillation. There is an automatic record of batch temperature and of pressure both in the reaction vessel and in the ancillary equipment. The temperature of the cooling water entering and leaving the condenser and the temperature of the condensate are also recorded.

Some phenolic resins are sold as solutions, some as liquid resins and the remainder as solids. In the case of solutions the solvent is added in the reaction vessel and after intimate mixing, the product is pumped to blending tanks.

An interesting feature of this entire building is the vacuum pump system. Instead of having a separate pump for each vessel, a battery of pumps is installed on the ground floor and every vessel is supplied from a single main.

THERMOSETTING POWDERS

Rockite thermosetting moulding powders are prepared from solid phenolic resins mixed with hexamine, colouring matter, lubricants and filler. The properties of a moulding powder are largely determined by the type of filler which constitutes about 50 per cent of the powder. Wood flour is normally used as a general purpose filler, but other materials are employed to give improved fire resistance, shock resistance and good electrical properties.

The various ingredients are premixed and then compounded either on rolls or in a mixer with which a mill is associated. Both types of equipment are steam heated so that the product is partly cured during compounding. Curing is completed after the powder has left the factory during the actual moulding operation. The aim therefore is to compound each product to the precise point necessary to give the final curing time required by the moulder.

After compounding, the product is ground, blended and tested. As a final control a test moulding is made from every batch.

The plant for the production of extrusions fr .i phenolics and urea moulding powders of the wood flour type has been operated for many years by British Resin Products Ltd. These are also marketed under the trade name of Rockite and are the only end products produced by the company. The extrusions possess excellent mechanical, chemical and electrical properties and comply in all respects with the requirements of BS 771 type of material. They will withstand temperatures of 100 to 110°C continuously and up to 160°C for short intermittent periods. They are resistent to acids, weak alkalis and the majority of industrial solvents.

THERMOPLASTIC POWDERS

The fourth production building is devoted to the manufacture of thermoplastic moulding powders from cellulose and the compounding of Geon pvc for the sister company British Geon.

Cellulose acetate moulding materials for injection moulding and extrusions are supplied as powders in a variety of hardnesses and in an almost unlimited range of colours. The Cellomold range includes a high acetyl material with good resistance to hot water and continuous damp conditions and a filled grade particularly suitable for industrial mouldings.

Thermoplastic moulding powders are produced by methods and on equipment similar to that used for thermosetting powders The basic resin is again mixed with colouring matter, fillers and lubricants, but an additional ingredient is the plasticizer which is usually dimethyl phthalate or dioctyl phthalate. The product emerges from the rolls or mixing machine as a continuous strip which is passed through a cooling bath before being cubed. The feed from the cuber is freed from dust and then packed in drums or bags. Alternatively the thermoplastic strip is broken up by a Masson cutter.

One department in this building is concerned only with colour. It produces colour concentrates and is responsible for matching colours to customers' requirements. Since the only satisfactory way of obtaining a required shade is to carry out practical trials, this department is equipped with small scale plant for the production and application of moulding powders.

The range of synthetic resins and moulding powders manufactured by British Resin Products Ltd. is extensive and it has only been possible to mention some typical products and to summarize the principal features of the processes by which they are made. Among the many other types of resin manufactured at Barry are resorcinol resins, coumarone-indene polymers, maleic resins, resinates, and emulsions of both the pva and polystyrene types for use in surface coatings and adhesives. In the course of a month

One of the research laboratories in the joint research establishment of British Geon, British Resin Products and Distrene

some hundreds of products are manufactured for use in surface coatings, adhesives, laminated boards and the various other uses outlined in this article.

Details of all batches are recorded including the reference number, order number, batch and blend numbers, machines used and all the relevant process data—temperatures, steam, vacuum etc.

All raw materials, intermediate products and finished goods are tested at a central control laboratory which is staffed to provide testing facilities 24 hours a day.

A staff of about 150 is employed in the research and development laboratories, which occupy an area of about 57,000 sq. ft. and serve British Resin Products Ltd., British Geon Ltd. and Distrene Ltd. All companies have their own research laboratories, semi-scale plant, technical sales and development sections. There is also an administration department which is responsible for providing such services as engineering, typing and cleaning and on the technical side, physical testing, chemical analysis and pilot plant operation. These services are utilized by all three companies.

Research is continually in progress on both new and existing products. At the present time, the research department are particularly interested, *inter alia*, in polyesters, epoxy resins, pva emulsions and copolymer dispersions. In addition much effort is being devoted to the development of resin for reinforcing rubber using raw materials indigenous to the United Kingdom.

Developments which give promising results on the laboratory bench are transferred to the pilot scale section, which is equipped to manufacture all types of product. Many of the novel processes now used in the works were developed on this plant which was modified and adapted until the most efficient set up had been achieved.

While the research side is concerned with the development of new products and uses, the technical service side is responsible for evaluating new products in established uses so that full technical guidance may be given to customers. Its laboratories are virtually small scale factories where paints and plywood can be manufactured and tested, or foundries where iron or non-ferrous castings can be produced from sands mixed with phenolic resins developed for use in the shell moulding process.

Wet Combustion of Waste Lyes

Experiments in Sweden with the so-called wet combustion method for utilizing the organic combustibles in waste lye from sulphite mills are far advanced and Mr. Karl Cederquist, superintendent engineer of the Central Laboratory of the Stora Kopparbergs Bergslags AB, has obtained a Swedish patent for such a method. The Cederquist method has not yet been used in a full-scale operation, but the process has been tried out at several pilot plants. An installation is now being planned for the Storvik sulphite mill which is owned by the Kopparfors Co.

Colour in Foods

Recommendations to Food Standards Committee

THE Minister of Agriculture, Fisheries and Food, the Rt. Hon. D. Heathcoat Amory, MP, has approved for publication a supplementary report presented to the Food Standards Committee by its Preservatives Sub-Committee, making recommendations about the use of colouring matters in foods.

An earlier report on this subject by the sub-committee was published in January, 1955. The main recommendation in that report was that the Public Health (Preservatives etc., in Food) Regulations, 1925-1953, should be amended so as to permit the use in foods of specified colours only. The present position under the preservatives regulations is that with a few specified exceptions, the addition of any colouring matters to articles of food is permitted.

Representations Received

The supplementary report, which should be read with the earlier report, reviews the representations which the sub-committee has received from trade and other interests. It sets out in greater detail than in the earlier report the sub-committee's views on the declaration of the presence in foods of added colour; and it recommends a slightly modified list of permitted colours. In other respects it re-affirms the recommendations in the earlier report.

As regards the list of permitted colours, the supplementary report recommends the inclusion of two additional colours of natural origin, titanium dioxide and ultramarine, and indicates that no objection is seen to the continued use in foods of the other organic colours of natural origin stated to be customarily used in foods. The revised recommended list of permitted colours of natural origin is given in Part (i) of Appendix II of the report.

As regards 'coal-tar' colours the latest available data on the colours specifically mentioned in the representations made to the sub-committee have been examined by a panel of the medical members of the sub-committee. In the light of the latest classifications and the stated need for the colours in question, a revised list of synthetic colours recommended for inclusion in the permitted list is given. The scientific names are expressed in accordance with current British practice. One colour, Baking Brown AW, has been deleted from the list proposed in the earlier report, and a black colour, Black PN, has been added.

In the earlier report it was recommended that in general the presence in foods of added colour should be declared to the purchaser. It was recognized, however, that exceptions to the general requirement might be necessary. In the supplementary report recommendations are made as to the form the declaration should take, the sales in respect of which declaration should apply and the foods which need not be required to bear a declaration of added colour. The sub-committee points out that adoption of its recommendations may necessitate some modification of the existing provisions of the Labelling of Food Order.

The Food Standards Committee has adopted the supplementary report. Before deciding, in consultation with the other Ministers concerned, what action should be taken on its recommendations, the Minister will consider any further representations from interested parties. The Minister will take into account representations already made to the sub-committee; it will not be necessary, therefore, for these to be repeated. Representations should be sent to the Assistant Secretary, Food Standards and Hygiene Division, Ministry of Agriculture, Fisheries and Food, Great Westminster House, Horseferry Road, London SW1, to arrive not later than 31 January, 1956. Copies of the supplementary report may be obtained from HM Stationery Office, York House, Kingsway, London WC2, or from any bookseller (price 9d plus postage).

ICI Move House

On 1 August Imperial Chemical Industries (New York) Ltd. moved house for the fourth time in its history—this time to the 19th floor of the Look Building, 488 Madison Avenue. The move was made to allow for substantial increases in staff and a broader field of activity. The present staff numbers nearly 60.

Fume Extraction

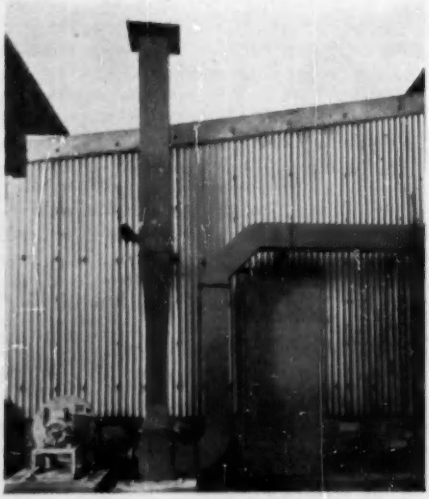
A New Ejector Draught System

ONE of the main problems in the extraction of corrosive fumes is the detrimental effect of the fumes on the moving parts of the exhaust fan, i.e. the impellor and driving shaft.

This problem has now been overcome by the use of a new ejector draught system as shown in the illustration. The corrosive fumes are collected in a conventional exhaust hood (not shown) which is connected to the base of the ejector stack by a range of rigid pvc ducting. A direct-driven blower provides high velocity air to a blast nozzle located inside the base of the ejector.

The kinetic energy supplied at the blast nozzle is utilized in providing the velocity and static pressure required to move the contaminated air. Each ejector is therefore designed to suit the particular application for which it is required. The blast nozzle, ejector stack, discharge duct and weather cowl are all constructed in rigid pvc which has exceptional corrosion—resisting properties and is virtually immune from attack by most acids and alkalis. The blower can be situated at any distance from the ejector stack which makes the equipment ideally suitable for handling explosive fumes.

The plant illustrated was installed for Pure Chemicals Ltd., by whose permission this reproduction is shown. Further details are obtainable from R. N. Watson Ltd., 14 Ridgefield, Manchester 2.



Fume extraction plant installed for Pure Chemicals Ltd.

Strengthening Thorium

Alloying with Carbon

THORIUM, a metal useful as a source of fissionable uranium, can be significantly strengthened for use in nuclear reactors by alloying with carbon. Three metallurgists at Battelle Institute, Columbus, Ohio, have observed that carbon, as an impurity in bomb-reduced thorium accounts for most of the difference in strength between bomb reduced thorium and high purity iodide thorium.

H. R. Ogden, R. M. Goldhoff, and R. J. Jaffee made this report in a paper presented on 12 December at the Engineers' Joint Council Nuclear Engineering and Science Congress, held in Cleveland.

In the Battelle research, 48 elements were tried as additions to thorium, but most of them did not appreciably affect the strength when added in dilute quantities. Alloying with 0.25 weight per cent of carbon, however, could double the tensile strength. In addition, precipitation hardening and cold working further enhanced the strength of the thorium-carbon alloys.

In another Battelle paper, 'The Fabrication and Properties of Thorium', H. A. Saller and J. R. Keeler noted that thorium metal, a potential source of nuclear fuel, is now available in sizeable quantities and that considerable engineering data on it had been amassed.

Thorium had been produced, they said, by reduction, thermal decomposition, and electrolysis of its compounds. At present, the process used for producing most of the metal was one similar to that used in producing uranium. Metallic thorium was made by reacting thorium fluoride with calcium in a bomb reduction process developed at Iowa State College.

The properties of pure thorium were reviewed in this paper. Pure thorium was a soft, ductile metal that was easily fabricated into sheets, rods, foil, and wire. It had a yield strength of about 25,000 psi and was stable in air. Thorium's properties, however, could be markedly altered by small amounts of impurities.

Fixed Nitrogen Facts & Figures

British Sulphate of Ammonia Federation's Annual Report

THE annual report for 1954/55 of the British Sulphate of Ammonia Federation Ltd., which has just been released, reveals that total UK production of nitrogen products during the calendar year 1954 was 0.9 per cent higher than in 1953, and that the output of fertilizer products decreased by 1.3 per cent, although industrial uses of fixed nitrogen increased by six per cent.

In 1954 the total production of nitrogen products and sulphate of ammonia in the UK totalled 2,149,300 long tons, an increase of 8,400 long tons over the previous year's figures. Included in this total is 660,500 long tons of industrial ammonia products and 1,049,400 long tons of sulphate of ammonia as such. The 1,049,400 long tons of sulphate of ammonia was produced with a nitrogen content varying from 20.4 per cent to 21.1 per cent; the remainder of the total, expressed in terms of standard material, contained 25 per cent ammonia = 20.6 per cent nitrogen.

UK Exports

Exports of sulphate of ammonia from the UK for the year ended 30 June totalled 308,678 tons, the biggest importer being Ceylon who imported 53,260 tons. Few of the regular buyers of UK sulphate of ammonia, however, increased their imports in 1954/55, and among those that did were included Portugal, Malaya and British Borneo, the Canary Islands, South Africa and Rhodesia, and Australia.

Second biggest single buyer was the British West Indies whose imports at 37,645 tons was 2,968 tons fewer than in the previous year. Australia increased her imports from the UK by 3,235 tons to 21,604 tons, and joint sales to South Africa and Rhodesia totalled 22,387 tons, an increase of more than 7,000 tons over 1953/54.

The report which contains the full list of importers of UK sulphate of ammonia also charts world production and consumption of fixed nitrogen for all purposes for the year 1954/55, giving comparative figures for the last three years. In 1954/55 world production totalled 7,947,800 metric tons as compared with 6,963,700 metric tons in 1953/54. Of this total Europe produced 4,226,500 metric tons, America 2,804,200 metric tons. Of the total consumption of 3,598,000 metric tons of fixed nitrogen in Europe during the year under review, 86.5 per cent was consumed as fertilizer. Of the American total of 2,749,600 metric tons, 76.1 per cent was consumed as fertilizer.

Highest producers of fixed nitrogen for all purposes in Europe were Eastern Germany and Russia with a combined total of 1,364,400 metric tons. As in France, the consumption of these countries exceeded production, the East German and Russian total being 1,676,300 metric tons, that of France 408,900 metric tons as against a production figure of 405,100 metric tons. Biggest producer outside the Communist bloc was West Germany with 890,600 metric tons, second was the UK with 449,100 metric tons.

Fixed nitrogen production in America, which includes the US, Canada, Hawaii, Puerto Rico and Chile, totalled 2,804,200 metric tons. Of this total the US with Puerto Rico and Hawaii contributed 2,326,000 metric tons, Canada 210,000 metric tons. The US was another country which consumed more than it produced, as did Egypt, the leading producer in the African group.

In a chapter devoted to manufacturing research in the UK the report states that the annual output of sulphate of ammonia by the By-Product Members registered as Grade 1 producers during the year was 134,000 tons, representing 45 per cent of the total make. In addition producers with a total output of 19,000 tons per year are making Grade 1 salt intermittently. Regarding experiments, the report says that the use of various resin cements and lacquers for protecting exposed surfaces has been continued with promising results, particularly with a furane lacquer reinforced with glass fibre.

Dicyclopentadiene Price Reduction

British Industrial Solvents, selling agents for British Petroleum Chemicals Ltd., have announced a reduction of £25 per ton in the price of dicyclopentadiene with effect from 14 December.

Midland Tar Distillers

A Year of Progress & Improvement

TRADING profit of the Midland Tar Distillers Ltd. for the year ended 30 June, 1955, at £391,864 showed an increase of £60,000 compared with the previous year. In a year in which considerable sums were spent on improvements and extensions, trading activities progressed and the intake of crude tar was a record.

Sales of coal tar fuels and refined tar for road surfaces increased, although the deliveries of creosote oil to ICI was reduced owing to internal difficulties at the ICI works. In the US the subsidiary company established itself and the sales of tar acids rose considerably above last year's figures.

Although trading profits increased by £60,000, the charge of income tax was reduced by £7,000 to £163,364, compared with £170,493 last year. This reduction was partly due to a cut in the standard rate of tax, but mainly it resulted from a provision made in the 1954 Finance Act which permits an investment allowance in respect of capital expenditure on new assets incurred after 6 April, 1954, and which reduced the company's taxation by £30,000 in respect of this allowance.

One of the main improvements made during the year was at Four Ashes where the main research work of the company is done. There and at The Springfield Chemical Works, Oldbury, in agreement with the Midlands Electricity Board, the company began generating its own electric power. But in spite of spending about £350,000 on fixed assets during the year, the company's current assets increased, over £500,000 being on loan to local authorities and at the bank. The directors have recommended a dividend of 10 per cent, less tax, on the ordinary shares.

SIMA's Permanent Exhibition

A PERMANENT exhibition by member firms is to be opened by the Scientific Instrument Manufacturers' Association at their headquarters at 20 Queen Street, London W1, on 9 February 1956. The exhibition will cover an entire floor of SIMA House, which has been completely modernized. But as sufficient space is not available to enable all member firms to show their products at the same time, space will be allocated by ballot for limited periods.

Although the exhibition is not intended to be a public one, it will be open to anyone interested in using any of the wide variety of instruments manufactured by SIMA members. Overseas visitors should find the exhibition useful as they will be able to inspect equipment made by a variety of firms. A comprehensive library of members' catalogues is also to be established.

Hungarians' Visit to UK

Tribute by Delegation Leader

PROFESSOR Bruno Straub, leader of the seven-man Hungarian scientific delegation which visited Britain recently, said in a statement to the magazine, *New Hungary*, that Hungary would like to have English professors to teach in Hungarian universities.

Describing the visit to Britain as a 'very good means of establishing contact', Professor Straub added that it was only a beginning. 'We must try other means of improving relations, such as sending some of our young people to work in English laboratories and to take courses, and inviting British scientists to come over and help with courses in Hungary. We hope something on those lines will develop from this visit.

'In my own field of biochemistry the modern application of radioactive tracer methods is of great interest to me. You cannot learn this properly from papers, but have to see methods in operation. It is personal contact which is important and I have gained much help from my visit to the Soviet Union and my visit to Oxford University. When scientists can get together they can exchange not only knowledge but opinions. Half-an-hour's talk is of much more practical value than hours of reading.'

The delegation visited the laboratories at Birmingham, Oxford and Cambridge universities, and individual members visited other places of special interest to them.

Professor Straub gave a lecture at the biochemistry department of Oxford and two lectures at the University College in London. Visits were paid to the Imperial College and the National Institute for Medical Research in London, and the delegation attended a meeting of the Royal Society and had tea with Fellows.

US Chemical Industry

Record Output for 1955 Says MCA

CHEMICAL industry sales in the US during 1955 are expected to reach an estimated $23,000,000,000, a new all-time record. This represents a 17.6 per cent increase over 1954 sales of $19,500,000,000, according to the Manufacturing Chemists' Association. America's fourth largest industry continued expansion of plants and facilities at a high level during the year and, based on preliminary estimates, total investment in plant expansion will exceed $1,000,000,000 for the fifth consecutive year.

Based on six month figures from government sources, profits after taxes for the first half of the year were $777,000,000 compared with $585,000,000 for the same period in 1954. Also according to the government, cash dividends paid by the chemical and allied products industries were $379,000,000 for the first half of 1955, some 16.6 per cent higher than the $325,000,000 paid during the first six months of last year. Chemical industry payments represented 13 per cent of all cash dividends paid by manufacturing industries during the period. It is estimated that the chemical and allied products industries will pay an estimated $1,400,000,000 in federal taxes alone during 1955.

Estimated chemical industry investment in plants and facilities during 1955 will be $1,000,000,000. This amount is equal to $1,621 per production worker. This marks the fifth consecutive year in which the industry has invested at least $1,000,000,000 in expansion. A detailed, state-by-state analysis of chemical industry expansion will be published by the MCA during January.

Production Record

Production, like sales, reached a new high in 1955. The Federal Reserve Board production index for the first eight months was 162 (base 1947-49 = 100). On the basis of the first six months' production, plastics and resins output for 1955 will reach an estimated 3,500,000,000 lb., 20 per cent above 1954's 2,900,000,000 lb. Man-made fibre production in the first three quarters of the year reached 1,200,000,000 lb., a 20 per cent increase over the 1,000,000,000 lb. produced during the corresponding period in 1954.

The chemical industry supplied direct employment to more than 810,000 men and women including 540,000 production workers. Average weekly earnings for hourly rated workers were $84.25, more than matching the generally higher wage trend for all manufacturing industries. In August the chemical industry separation rate was 1.8 per 100 employees compared with 4.1 per 100 for all manufacturing. Overall, the industry has the second lowest industrial labour turnover rate.

The chemical industry continues among the safest in America. On-the-job accident frequency for the first nine months of 1955 was at the rate of 3.27 per million manhours worked, comparable with the all time low established for the calendar year of 1954. Off-the-job accident statistics for the first six months, reported for the first time by the MCA, show an average frequency rate of 6.26 per million manhours worked, proving that a chemical industry employee is safer on the job than he is off the job.

The MCA represents over 90 per cent of the productive capacity of the American chemical industry.

Special Technology Courses

PUBLICITY for special advanced courses held in London and the home counties region is the purpose of a booklet 'Bulletin of Special Courses in Higher Technology 1955-56' part II of which, covering spring and summer terms 1956, has just been published by the Regional Advisory Council, Tavistock House South, Tavistock Square, London WC1, price 1s 6d.

The recommended scale of fees for special advanced courses appearing in this bulletin is: up to six lectures—10s 6d, seven to 12 lectures—£1, 13 to 20 lectures—£1 10s, over 20 lectures—£2.

The courses which are listed are described as those which do not normally appear in college calendars or prospectuses as part of a grouped course or as subjects offered for endorsement on Higher National Certificates. They are as a rule part time (usually evening) courses but full time courses which are specially arranged and are not longer than three months are also included.

Most branches of science and technology are included, together with courses on economics, management etc.

Canadian Chemicals

Development Problems Discussed

FUTURE growth and development of the chemical industry in Canada will hinge on the Government's attitude toward secondary industry, as reflected in tariff policy, it was asserted by Dr. J. H. Shipley, co-ordinator of research and development, Canadian Industries (1954) Ltd. in Montreal recently.

Speaking at a meeting of the Montreal Institute of Investment Analysts, Dr. Shipley declared that if tariff policy continued to be directed, as in recent years, to reciprocal, progressive reduction of duties, the chemical industry's growth would depend almost entirely on economic growth and higher consumption by various other industries.

But upward revision of present tariff rates, he said, would accelerate diversification into output of products now imported, and displacement of natural materials by new chemical products or new applications of those already manufactured. However, he foresaw sustained and natural growth in the chemical industry, regardless of tariffs, to some extent from diversification and displacement as well as normal expansion.

Tariff Protection Inadequate

Dr. Shipley, who is a director of CIL, said a particular cause of concern to the Canadian chemical industry was the ability of foreign countries to export textile products to Canada over existing tariff walls. He pointed out that textile manufacture afforded a considerable market for chemicals and synthetic fibres, and noted that before long there might be over-production in the US and other countries of certain synthetic resins enjoying only a narrow margin of tariff protection in Canada.

Another problem of the industry, Dr. Shipley said, was expansion of production facilities in certain lines which had resulted in capacity in excess of immediate requirements. This emphasized the need for larger markets for such products both at home and abroad, and the costly geographical separation between natural resources and the concentrated markets in central Canada.

In the progressive further displacement of natural materials by new chemicals or new chemical applications, Dr. Shipley declared, the resources of Canadian companies for research and development would play a vital part. He noted that CIL was spending more than $2,000,000 a year on such activities, had facilities which involved investment of as much as $2,000,000 at a single new plant, and had the benefit of access to the research facilities of Imperial Chemical Industries Ltd. of Britain, chief shareholders in CIL.

Dr. Shipley reported that since CIL-54 was formed 17 months ago, by division of the original CIL, the company had spent on plant investment almost as much as the $38,000,000 spent in the 8½ years before segregation, and projects authorized totalled $44,500,000. He said CIL was not the largest company in the chemical and allied products industry in Canada in dollar value of sales, and accounted for about 10 per cent of the industry's total value of output.

Automatic Computation

'MACHINE Computation in Chemical Engineering—Its Progress and Potential' was the subject chosen by Mr. John Burnham Roberts for the seventh annual lecture of the American Institute of Chemical Engineers, given on 28 November during the 48th Annual General Meeting at Detroit.

The importance of Mr. Roberts' subject grows greater every day. Automatic computation is already invaluable to chemical engineering and its potential value is unlimited. Some complex calculations, such as prediction of chemical equilibria and design of distillation towers, have already been mechanized for routine computor solution. More complex problems, such as the performance of intricate equipment or even complete chemical processes, once considered too intricate to be undertaken, now appear to be soluble by the mathematical approach. While the problems that can be handled by the computors are growing more and more complex, operation of the machines themselves is growing more simple, and the engineer himself may soon be able to solve his own problems on them with little or no aid from the computor specialist.

Mr. Roberts graduated from Dartmouth College in 1934 and received his M.S. from the Massachusetts Institute of Technology in 1936. Since then he has been constantly in the service of Dupont in various capacities. He was appointed research supervisor in 1950 and took over his present position, that of research manager, in 1953.

HOME

Scottish Firm Moves

Owing to expansion of business, Scientific Instruments (Glasgow) Ltd. moved to a new factory on 28 November. The new address of the firm is Landsdown House, 154-156 Grovepark Street, Glasgow NW. The telephone number is DOUglas 3067.

Trade Refuse Disposal

Two representatives of chemical firms, Mr. E. W. T. Howard, B.A., of ICI Dyestuffs Division, and Mr. A. Morton of L. B. Holliday & Co. Ltd., are among the members appointed to represent the traders of Huddersfield on a committee constituted under Section Three of the Huddersfield Provisonal Order 1925 which relates to the disposal of trade refuse.

Factory Equipment Exhibition

The Rt. Hon. Peter Thorneycroft, MP, President of the Board of Trade, will open the 1956 Factory Equipment Exhibition to be held at Earls Court, London, from 9 to 14 April. The exhibition will be the fourth in the series and will be the biggest so far staged. It will occupy over 250,000 square feet.

Treasury Notice

The Treasury have made the Import Duties (Drawback) (No. 9) Order, 1955, which provides for the allowance of drawback of customs duty paid on solid potassium hydroxide of 88-92 per cent purity when it is exported or shipped as stores. The Order, which came into operation on 16 December, has been published as Statutory Instruments 1955, No. 1856.

Soldering of Aluminium

Tiltman Langley Ltd., research and development consultants, of Redhill, Surrey, claim to have devised a new method of soldering aluminium. Working under a Ministry of Supply contract they have developed a soldering tool in the form of a small brush which is light and easy to manipulate. An important feature of the method is the low working temperature—250°C. An electric hotplate is used to raise the surface of the work to the correct temperature. A small pool of solder is then deposited on the surfaces to be joined and a fibre glass brush is used to spread the solder along the joint.

Fertilizer Lecture

At the general meeting of the Fertiliser Society to be held on 12 January 1956 at 2.30 p.m. in the lecture hall of the Geological Society, Burlington House, Piccadilly, London W1, Mr. E. W. Schwehr, B.Sc., will present a paper entitled 'The Effect of Sampling on Fertilizer Analysis'. The paper will be followed by a discussion.

The Chemical Society Library

The Council of The Chemical Society has revised three regulations concerning the library. For the period October to July 1956, the closing time will be altered from 9 p.m. to 7.30 p.m., Saturdays 5 p.m. Two of the rules will operate from the start of the new year. One, concerning the period of loan, will reduce the period from one month to 14 days, the other will apply to periodical material which will be made available for loan whether held in duplicate or not, at the librarian's discretion.

Institute of Fuel Meeting

On Wednesday, 4 January at 5.30 p.m., at a meeting of The Institute of Fuel at the Institution of Civil Engineers, Great George Street, London SW1, Mr. R. L. Brown, director of research laboratories, BCURA, will present a paper on 'Some Coal Research Problems and Their Industrial Implications.' Stencilled copies of the paper will be available a few days before the meeting from the Secretary of the Institute, 18 Devonshire Street, Portland Place, London W1.

British Occupational Hygiene Society

The first provincial meeting of the British Occupational Hygiene Society, for members only, will be held at Liverpool on 19 and 20 April 1956, in collaboration with the general chemicals division of ICI. Papers will be presented on chlorine, dust sampling and the control of the fluorine hazard by members of the staff of ICI, and factory visits relating to the subjects discussed will be arranged. Accommodation is being booked in the University Hall, Liverpool. Persons wishing to attend the meeting should apply to the Hon. Scientific Secretary, Dr. D. Turner, Environmental Hygiene Research Unit, MRC Laboratories, Holly Hill, London NW3.

• OVERSEAS •

Third Fertilizer Factory

Agricultural Chemicals Ltd., is to build a fertilizer factory at Hyde Park, London, Ontario, The factory is expected to be in operation by July or August, 1956. The company has fertilizer factories operating at Port Hope, Ontario, and at Fort Chambly, near Montreal.

Uranium Energy

Speaking at Lille on 4 December, M. Francis Perrin, France's High Commissioner for Atomic Energy, said that the world production of uranium, which now exceeded 10,000 tons a year, was equivalent to 10 times the energy represented by the present production of coal.

US Synthetic Rubber Research

In Washington on 19 December an Advisory Commission recommended that the US Government should terminate its contracts supporting synthetic rubber research by next June. The research is costing the Government about $1,000,000 a year.

US Rubber Plant

The General Tire & Rubber Co. and the El Paso (Texas) Natural Gas Co. are to build jointly in Texas what is described as the first US post-war, privately financed and completely integrated synthetic rubber factory. The companies state that construction of the 'multi-million-dollar' copolymer factory, to produce general purpose synthetic rubber and facilities to make the intermediate materials styrene and butadiene, is scheduled to begin at once.

N. Zealand Oil Exploration

The BP group, through its wholly owned subsidiary D'Arcy Exploration has entered into an agreement to participate in the programme of oil exploration in New Zealand recently announced by the Shell group and Todd Brothers. The initial exploration programme calls for an expenditure of not less than £1,000,000 and the BP group will contribute £500,000.

Refinery in Philippines

The Standard Vacuum Oil Co. announces that it plans to erect in the Philippines a petroleum refinery having a daily capacity of 21,000 barrels. It will cost Pesos 70,000,000 (£12,000,000).

Goodrich Plant Contract

B.F. Goodrich of Canada Ltd., has awarded a Toronto firm a contract to build a $3,500,000 chemical plant in Thorold, near Niagara Falls. The company, Arthur G. McKee & Co. of Canada Ltd., will start construction on the project next spring. The plant is scheduled for completion in 1957.

Import Duty Suspended

During the period 1 December 1955 to 31 May 1956, import duty will be suspended in Benelux countries on sulphuric acid, including fuming sulphuric acid (oleum), and sulphur dioxide. This was announced in a Royal Decree, dated 24 November, which was published in the *Moniteur Belge*.

Middle East Oil Record

Middle East oil production had, by the end of November, already passed the record level achieved in the whole of 1954, according to figures issued recently by the Petroleum Information Bureau. The total for 1955 is likely to be over 160,000,000 tons, compared with 137,500,000 tons in 1954.

First Greek Refinery

On 15 December at Aspropyrgos in Attica King Paul laid the foundation stone of the first Greek oil refinery. The plant, costing £4,000,000 and financed by credit from German firms, is expected to begin production in two years' time. An initial output equal to the present home consumption of liquid fuels is expected. It is estimated that Greece will save nearly $6,000,000 annually on foreign exchange.

US Carbon Black

According to a recently published report by the US Bureau of Mines the daily average shipments of carbon black in October increased by two per cent over the previous month. Stocks of furnace grades increased by 2,000,000 lb., and furnace black stocks by 9,000,000 lb.

Proceedings of UN Atom Conference

Mr. Dag Hammarskjold, Secretary-General of the United Nations, has sent President Eisenhower a copy of the first of the 16 volumes of the proceedings of the International Conference on the Peaceful Uses of Atomic Energy. A copy was also sent to Dr. Homi J. Bhabha of India. The conference was held in Geneva in August.

· PERSONAL ·

MR. L. E. J. BROUWER, general manager of the Iranian Oil Exploration and Producing Co. and the Iranian Oil Refining Co. in Teheran, will be leaving Teheran towards the end of March to take up a post in the Royal Dutch-Shell Group. He will be succeeded as general managing director of the two companies in Iran by MR. K. SCHOLTENS, a Dutch mining engineer, who has at present a senior position in the Bataafsche Petroleum Maatschappij, the main Netherlands operating subsidiary of the Royal Dutch-Shell Group.

MR. K. J. B. WOLFE, M.Sc., has been appointed head of fundamental research by the Triplex Safety Glass Co. Ltd., and will take charge of the company's new research department to be built at their Willesden factory in West London. Mr. Wolfe was formerly deputy director of research for the BSA Co. Ltd., and chief metallurgist, BSA Tools Group of Companies. The formation of Precision Alloy Castings (Birmingham) Ltd., of which Mr. Wolfe was technical director, was the result of his research work. Before joining the BSA Group 10 years ago, he had experience with the Air Ministry, Pressed Steel Co. Ltd., and in the wire, steel and foundry industries.

DR. EDGAR C. BRITTON, Ph.D., director of the Edgar C. Britton Research Laboratory of the Dow Chemical Co., Midland, Michigan, US, and past president of the American Chemical Society, has been chosen to receive the highest award in American industrial chemistry, the Perkin Medal of the American Section of the Society of Chemical Industry for 1956. The 1956 award will be the 50th impression of the Perkin Medal. It is bestowed annually for outstanding achievement in applied chemistry in the US. Established in 1906, the medal honours Sir William Henry Perkin and commemorates his discovery of the first synthetic dye in 1856. The medal will be presented to Dr. Britton in September 1956 at a dinner in his honour forming part of the celebration of the centenary of Perkin's synthesis of mauve.

Mobil Oil Company has announced that DR. R. B. KILLINGSWORTH, Ph.D., F.Inst.Pet., manager of the company's technical department since 1952, returned to the US on 14 December and has been succeeded by MR. A. G. DICKINS, B.Sc., A.R.I.C., F.Inst.Pet. Dr. Killingsworth was seconded on a long-term basis from the headquarters of the Socony Mobil Oil Laboratories Division, New York, following the commissioning of Coryton Refinery in 1953. Prior to his coming to the UK he had been assistant to the director of the division. Mr. Dickins graduated in Hons.Chem. at Durham University in 1938. In 1940 he was commissioned in the Royal Engineers Chemical Warfare Groups. After these groups were disbanded, he served in the UK and India, before being demobilised, with the rank of major, in 1946. The following year he joined the staff of the Royal Military Academy, Sandhurst, as Senior Lecturer in Science, including fuels and explosives. Mr. Dickins joined Mobil Oil Company in 1951 and was in charge of the Analytical Division at the Central Laboratories, Wandsworth. A year later he became Superintendent, and in June 1955, he was appointed assistant manager of the Technical Department.

Mr. G. A. Dickins

After 30 years as joint managing directors of John & E. Sturge Ltd., chemical manufacturers of Birmingham, MR. A. L. WILSON and his cousin, MR. A. P. WILSON, have relinquished their positions. They will continue their interests on the board as chairman and deputy-chairman respectively. Succeeding them as joint managing directors as from 1 January 1956 will be MR. A. R. FOXALL, B.A., and DR. E. R. S. WINTER, B.Sc., Ph.D., A.R.C.S., D.I.C., F.R.I.C. Mr Foxall joined the firm in 1932, becoming sales manager in 1941. In 1949 he was ap-

pointed to the board as a commercial director. Dr. Winter, a lecturer in physical chemistry at Imperial College, London, from 1945 to 1949, joined the company as technical director in 1949.

MR. KEITH A. HOGAN, MR. WILLIAM H. SHARLAND and MR. DOUGLAS G. BADHAM have been appointed directors of Powell Duffryn Ltd. All three hold directorships in various Powell Duffryn subsidiaries: Mr. Hogan (Stephenson Clarke Ltd., Powell Duffryn Carbon Products Ltd., and Powell Duffryn Technical Services Ltd.), Mr. Sharland (Stephenson Clarke Ltd., and Associated Coal & Wharf Co. Ltd.), Mr. Badham (Cambrian Waggon Engineering Co., and Powell Duffryn Timber Industries Ltd.).

SIR ERNEST LEVER, chairman of Richard Thomas & Baldwins Ltd., will succeed MR. A. G. STEWART, chairman and general managing director of Stewarts & Lloyds Ltd., as president of the British Iron & Steel Federation on 1 January 1956. At a meeting of the council of the Federation SIR ANDREW MCCANCE, F.R.S., deputy chairman and joint managing director of Colvilles Ltd., was appointed president-elect of the Federation for 1956.

SIR GEORGE THOMSON and SIR HUGH WARREN have accepted invitations to become members of the technical committee of the International Tin Research Council. Sir George Thomson has been master of Corpus Christi College, Cambridge, since 1952, and Sir Hugh Warren, who recently retired from the managing directorship of Associated Electrical Industries, was formerly for many years director of research to the British Thomson-Houston Co.

MR. W. J. VINES has been appointed managing director of Lewis Berger & Sons. Mr. Vines has been an executive director of Berger Group companies in Australia and is now resident in London.

Tecalemit Ltd., lubrication manufacturers of Brentford, Middlesex and Plymouth, Devon, have appointed MR. T. R. HARDMAN as general manager. Mr. Hardman, aged 43, joined the company at its Brentford, Middlesex, works in 1941 as a draughtsman. He was appointed chief draughtsman in 1946. In 1948 he became assistant to the technical director and was directly concerned with the design and erection of the Tecalemit factory at Plymouth. In 1954 Mr. Hardman was made a director of the newly-acquired company, Foamite Ltd. In his new appointment he will be responsible to the managing director, MR. P. R. SCUTT, and his interests will include all industries in which Tecalemit lubrication is employed.

DR. FRANK A. TODD has been appointed a director of Fisons Milk Products Ltd., a member company of the Fisons group. Dr. Todd is technical manager and a director of Genatosan, the parent company of Fisons Milk Products Ltd.

Newly elected president of the American Institute of Chemical Engineers for 1956 is PROFESSOR WALTER G. WHITMAN, B.S., M.S., Conference Secretary-General of the United Nations International Conference on Peaceful Uses of Atomic Energy, and professor and head of the Department of Chemical Engineering at the Massachusetts Institute of Technology. PROFESSOR J. HENRY RUSHTON, B.S., Ph.D., professor of chemical engineering at Purdue University, West Lafayette, Indiana, was elected vice-president.

Imperial Chemical Industries Ltd. have appointed two assistant publicity controllers to work under MR. B. W. GALVIN WRIGHT. They are MR. GORDON LONG and MR. A. Q. TOLLIT. Mr. Long will still continue to be responsible for the publicity and information sections of the Central Publicity Department, including the Press section (MR. GEOFFREY RICHARDS is the Press officer). Mr. Tollit is being transferred from his present position as publicity manager of Imperial Chemical (Pharmaceuticals) Ltd. He is to be responsible for the commercial advertising section of the department. This will allow MR. W. J. MARRABLE to concentrate on the company's expanding exhibitions programme. Mr. Marrable is due to retire in 1957. These changes are intended to secure the long-term delegation of responsibility within the Department.

Change of Address

Wynn (Valves) Ltd., manufacturers of Wynn patented straight through diaphragm valves, is moving on 1 January 1956, to Granville Street, Birmingham 1 (telephone: Midland 1315; telegrams and cables: Wynvalve, Birmingham).

British Chemical Prices

(These prices are checked with the manufacturers, but it must be pointed out that in many cases there are variations according to quantity, quality, place of delivery, etc.)

LONDON.—There has been very little business in the short week following the holiday, and the markets are not expected to show much activity until the New Year. At the time of this report no further price changes have been received.

MANCHESTER.—Unusual at this time of year, extremely quiet trading conditions have been experienced during the past week, deliveries having been largely suspended and little interest shown in the placing of new business. On the whole, however, a cheerful view is being taken of the prospects for 1956, and the outlook for an improvement in the cotton and allied industries—an important chemical consumer—is regarded with cautious optimism.

GLASGOW.—Continued activity has to be reported from the Scottish market during the past week. Orders are being well maintained in most sections of the industry, and cover a wide range of chemicals. It is expected, however, that generally it may ease-up with the approach of the New Year holidays. With the exception of a few alterations, prices generally remain steady. The export market is still very satisfactory.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 10 tons, £83 ; 80% pure, 10 tons, £89 ; commercial glacial, 10 tons, £91 ; delivered buyers' premises in returnable barrels (technical acid barrels free) ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £123 per ton.

Alum.—Ground, about £25 per ton, f.o.r. MANCHESTER : Ground, £25.

Aluminium Sulphate.—Ex works, £14 15s per ton d/d. MANCHESTER : £14 10s to £17 15s.

Ammonia, Anhydrous.—1s 9d to 2s 3d per lb.

Ammonium Bicarbonate.—2-cwt. non-returnable drums, 1-cwt. non-returnable kegs ; 1-ton lots, £50 5s per ton.

Ammonium Chloride.—Per ton lot, in non-returnable packaging, £27 17s 6d.

Ammonium Nitrate.—D/d, £31 per ton (in 4-ton lots).

Ammonium Persulphate. — MANCHESTER : £6 2s 6d per cwt., in 1-cwt. lots, delivered. £112 10s per ton, in minimum 1-ton lots, delivered.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £97 and £94 10s per ton.

Antimony Sulphide.—Crimson, 4s 4d to 4s 9½d ; golden, 2s 7½d to 4s 0½d ; all per lb., delivered UK in minimum 1-ton lots.

Arsenic.—Per ton, £45 to £50 ex store.

Barium Carbonate.—Precip., d/d ; 4-ton lots, £41 per ton ; 2-ton lots, £41 10s per ton, bag packing.

Barium Chloride.—£42 15s per ton in 2-ton lots.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £42 10s per ton d/d ; 2-ton lots, £43 per ton d/d.

Bleaching Powder.—£28 12 6d per ton in returnable casks, carriage paid station, in 4-ton lots.

Borax.—Per ton for ton lots, in hessian sacks, carriage paid : Technical, anhydrous, £61 10s ; granular, £41 ; crystal, £43 10s ; powder, £44 10s ; extra fine powder, £45 10s ; BP, granular, £50 ; crystal, £52 10s ; powder, £53 10s ; extra fine powder, £54 10s.

Boric Acid.—Per ton for ton lots, in hessian sacks, carriage paid : Technical, granular, £70 ; crystal, £78 ; powder, £75 10s ; extra fine powder, £77 10s ; BP granular, £83 ; crystal, £90 ; powder, £87 10s ; extra fine powder, £89 10s.

Calcium Chloride.—Per ton lots, in non-returnable packaging : solid, £15 ; flake, £16.

Chlorine, Liquid.— £37 10s per ton, in returnable 16-17-cwt. drums, delivered address in 3-drum lots.

Chromic Acid.—2s 0⅝d per lb., less 2½%, d/d UK, in 1-ton lots.

Chromium Sulphate, Basic.—Crystals, 7⅞d per lb. delivered (£73 10s per ton).

Citric Acid.—1-cwt. lots, £10 5s cwt.

Cobalt Oxide.—Black, delivered, bulk quantities, 13s 2d per lb.

Copper Carbonate.—3s per lb.

Copper Sulphate.—£121 per ton f.o.b., less 2% in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £11 12s.

Formaldehyde.—£37 5s per ton in casks, d/d.

Formic Acid.—85%, £86 10s in 4-ton lots, carriage paid.

Glycerine.—Chemically pure, double distilled 1.260 S.G., £13 3s 6d to £13 14s 6d per cwt. Refined pale straw industrial, 5s per cwt. less than chemically pure.

Hydrochloric Acid.—Spot, about 12s per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s 3d to 1s 6d per lb.

Hydrogen Peroxide.—27.5% wt., £128 10s per ton. 35% wt., £158 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 17s 7d per lb., in 28-lb. lots.

Iodoform.—£1 6s 7d per lb., in 28-lb. lots.

Lactic Acid.—Pale tech., 44 per cent by weight, 14d per lb. ; dark tech., 44 per cent by weight, 8½d per lb., ex-works ; chemical quality, 44 per cent by weight, 12½d per lb., ex-works ; 1-ton lots, usual container terms.

Lead Acetate.—White : About £143 10s per ton.

Lead Nitrate.—About £129 10s 1-ton lots.

Lead, Red.—Basis prices per ton. Genuine dry red, £142 15s ; orange lead, £154 15s. Ground in oil : red, £159 15s ; orange, £171 15s.

Lead, White.—Basis prices : Dry English in 5-cwt. casks £147 15s per ton. Ground in oil : English, 1-cwt. lots 184s per cwt.

Lime Acetate.—Brown, ton lots, d/d, £40 per ton ; grey, 80-82%, ton lots, d/d, £45 per ton.

Litharge.—£144 15s per ton, in 5-ton lots.

Magnesite.—Calcined, in bags, ex-works, about £21 per ton.

Magnesium Carbonate.—Light, commercial, d/d, 2-ton lots, £84 10s per ton, under 2 tons, £92 per ton.

Magnesium Chloride.—Solid (ex-wharf), £16 per ton.

Magnesium Oxide.—Light, commercial, d/d, under 1-ton lots, £245 per ton.

Magnesium Sulphate.—Crystals, £16 per ton.

Mercuric Chloride.—Technical Powder, £1 5s per lb., in 5-cwt. lots ; smaller quantities dearer.

Mercury Sulphide, Red.—£1 9s 3d per lb., for 5-cwt. lots.

Nickel Sulphate.—D/d, buyers UK £170 per ton. Nominal.

Nitric Acid.—80° Tw., £35 per ton.

Oxalic Acid.—Home manufacture, minimum 4-ton lots, in 5-cwt. casks, about £130 per ton, carriage paid.

Phosphoric Acid.—Technical (S.G. 1.700) ton lots, carriage paid, £92 per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s 3½d per lb.

Potash, Caustic.—Solid, £93 10s per ton for 1-ton lots ; Liquid, £36 5s.

Potassium Carbonate. — Calcined, 96/98%, about £74 10s per ton for 1-ton lots, ex-store.

Potassium Chloride.—Industrial, 96%, 1-ton lots, about £24 per ton.

Potassium Dichromate.—Crystals and granular, 1s 1d per lb., in 5-cwt. to 1-ton lots, d/d UK.

Potassium Iodide.—B.P., 14s 1d per lb. in 28-lb. lots ; 13s 7d in cwt. lots.

Potassium Nitrate.—In 4-ton lots, in non-returnable packaging, paid address, £63 10s per ton.

Potassium Permanganate.—BP, 1-cwt. lots, 1s 9d per lb. ; 3-cwt. lots, 1s 8½d per lb. ; 5-cwt. lots, 1s 8d per lb. ; 1-ton lots, 1s 7¾d per lb. ; 5-ton lots, 1s 7½d per lb. ; Tech., 5-cwt. packed in 1-cwt. drums, £8 14s 6d per cwt. ; packed in 1 drum, £8 9s. 6d per cwt.

Salammoniac.—Per ton lot, in non-returnable packaging, £45 10s.

Salicylic Acid. — MANCHESTER : Technical 2s 7½d per lb. d/d.

Soda Ash.—58% ex-depot or d/d, London station, about £15 5s 6d per ton, 1-ton lots.

Soda, Caustic.—Solid 76/77% ; spot, £30 to £32 per ton d/d (4 ton lots).

Sodium Acetate.—Commercial crystals, £91 per ton d/d.

Sodium Bicarbonate.—Per ton lot, in non-returnable packaging, £15 10s.

Sodium Bisulphite. — Powder, 60/62%, £42 15s d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—Per ton lot, in non-returnable packaging, paid address, £59 5s.

Sodium Chlorate.—About £80 per ton in 1-cwt. drums, carriage paid station, in 4-ton lots.

Sodium Cyanide.—96/98%, £113 5s per ton lot in 1-cwt. drums.

Sodium Dichromate.—Crystals, cake and powder, 10¾d per lb. Net d/d UK, anhydrous, 1s 0½d per lb. Net del. d/d UK, 5-cwt. to 1-ton lots.

Sodium Fluoride.—Delivered, 1-ton lots and over, £5 per cwt. ; 1-cwt. lots, £5 10s per cwt.

Sodium Hyposulphite.—Pea crystals £35 15s a ton ; commercial, 1-ton lots, £32 10s per ton, carriage paid.

Sodium Iodide.—BP, 17s 1d per lb. in 28-lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £133 per ton.

Sodium Metasilicate.—£25 per ton, d/d UK in ton lots, loaned bags.

Sodium Nitrate.—Chilean refined granulated over 98% 6-ton lots, d/d station, £28 10s.

Sodium Nitrite.—£32 per ton (4-ton lots).

Sodium Percarbonate.—12½% available oxygen, £8 6s 9d per cwt. in 1-cwt. kegs.

Sodium Phosphate.—Per ton d/d for ton lots : Di-sodium, crystalline, £38 10s, anhydrous, £84 ; tri-sodium, crystalline, £39 10s, anhydrous, £82.

Sodium Silicate.—75-84° Tw. Lancashire and Cheshire, 4-ton lots, d/d station in loaned drums, £10 15s per ton ; Dorset, Somerset and Devon, £3 17s 6d per ton extra ; Scotland and S. Wales, £3 per ton extra. Elsewhere in England, excluding Cornwall, and Wales, £1 12s 6d per ton extra.

Sodium Sulphate (Glauber's Salt).—About £9 5s per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER : £6 10s per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot, £33 2s 6d per ton, d/d, in drums in 1-ton lots ; broken, £34 2s 6d per ton, d/d, in drums in 1-ton lots.

Sodium Sulphite.—Anhydrous, £66 5s per ton ; commercial, £25 5s to £27 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £20 to £22, according to fineness.

Sulphuric Acid.—Net, naked at works, 168° Tw. according to quality, per ton, £10 7s 6d to £12 ; 140° Tw., arsenic free, per ton, £8 12s 6d ; 140° Tw., arsenious, per ton, £8 4s 6d.

Tartaric Acid.—Per cwt. : 10 cwt. or more £13 15s.

Titanium Oxide.—Standard grade comm., with rutile structure, £162 per ton ; standard grade comm., £142 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d, white seal, £113 ; green seal, £111 ; red seal, 2-ton lots, £109 per ton.

Solvents & Plasticizers

Acetone.—Small lots : In 5-gal. cans : 5-gal., £125, 10-gal. and upward, £115, cans included. In 40/45 gal. returnable drums, spot : Less than 1 ton, £90 ; 1 to less than 5 tons, £87 ; 5 to less than 10 tons, £86 ; 10 tons and upward, £85. In tank wagons, spot : 1 to less than 5 tons (min. 400 gal.), £85 ; 5 to less than 10 tons (1,500 gal.), £84 ; 10 tons and upward (2,500 gal.), £83 ; contract rebate, £2. All per ton d/d.

Butyl Acetate BSS.—£159 per ton, in 10-ton lots.

***n*-Butyl alcohol, BSS.**—10 tons, in drums, £143 per ton d/d.

***sec*-Butyl Alcohol.**—5 gal. drums £159 ; 40 gal. drums : less than 1 ton £124 per ton ; 1 to 10 tons £123 per ton ; 10 tons and over £119 per ton ; 100 tons and over £120 per ton.

***tert*-Butyl Alcohol.**—5-gal. drums £195 10s. per ton ; 40/45 gal. drums : less than 1 ton £175 10s per ton ; 1 to 5 tons £174 10s per ton ; 5 to 10 tons, £173 10s ; 10 tons and over £172 10s.

Diacetone Alcohol.—Small lots : 5 gal. drums, £177 per ton ; 10 gal. drums, £167 per ton. In 40/45 gal. drums ; less than 1 ton, £142 per ton ; 1 to 9 tons, £141 per ton ; 10 to 50 tons, £140 per ton ; 50 to 100 tons, £139 per ton ; 100 tons and over, £138 per ton.

Dibutyl Phthalate.—In drums, 10 tons, 2s per lb. d/d ; 45-gal. drums, 2s 1½d per lb. d/d.

Diethyl Phthalate.—In drums, 10 tons, 1s 11½d per lb. d/d ; 45 gal. drums, 2s 1d per lb. d/d.

Dimethyl Phthalate.—In drums, 10 tons, 1s 9d per lb. d/d ; 45 gal. drums, 1s 10½d per lb. d/d.

Dioctyl Phthalate.—In drums, 10 tons, 2s 8d per lb. d/d ; 45 gal. drums, 2s 9½d per lb. d/d.

Ether BSS.—In 1 ton lots, 1s 11d per lb. ; drums extra.

Ethyl Acetate.—10 tons lots, d/d, £128 per ton.

Ethyl Alcohol (PBS 66 o.p.).—Over 300,000 p. gal., 2s 9d ; 2,500-10,000 p. gal., 2s 11½d per p. gal., d/d in tankers. D/D in 40/45-gal. drums, 1d p.p.g. extra. Absolute alcohol (75.2 o.p.) 5d p.p.g. extra.

Methanol.—Pure synthetic, d/d, £43 15s per ton.

Methylated Spirit.—Industrial 66° o.p. : 500 gal. and over in tankers, 4s 10d per gal. d/d ; 100-499 gal. in drums, 5s 2½d per gal. d/d. Pyridinised 64 o.p. : 500 gal. and over in tankers, 5s 0d per gal. d/d ; 100-499 gal. in drums, 5s 4½d per gal. d/d.

Methyl Ethyl Ketone.—10-ton lots, £133 per ton d/d ; 100-ton lots, £131 per ton d/d.

Methyl *iso*Butyl Ketone.—10 tons and over £159 per ton.

***iso*Propyl Acetate.**—In drums, 10 tons, £123 per ton d/d ; 45 gal. drums, £129 per ton d/d.

***iso*Propyl Alcohol.**—Small lots: 5-gal. drums, £118 per ton ; 10-gal. drums, £108 per ton ; in 40-45 gal. drums ; less than 1 ton, £83 per ton ; 1 to 9 tons £81 per ton ; 10 to 50 tons, £80 10s per ton ; 50 tons and over, £80 per ton.

Rubber Chemicals

Carbon Bisulphide.—£61 to £67 per ton, according to quality.

Carbon Black.—8d to 1s per lb., according to packing.

Carbon Tetrachloride.—Ton lots, £79 10s per ton.

India-Rubber Substitutes.—White, 1s 5¾d to 1s 9½d per lb. ; dark, 1s 4d to 1s 6¾d per lb. delivered free to customers' works.

Lithopone.—30%, about £52 per ton.

Mineral Black.—£7 10s to £10 per ton.

Sulphur Chloride.—British, about £50 per ton.

Vegetable Lamp Black.—£64 8s per ton in 2-ton lots.

Vermilion.—Pale or deep, 15s 6d per lb. for 7-lb. lots.

Coal-Tar Products

Benzole.—Per gal., minimum of 200 gals. delivered in bulk, 90's, 5s ; pure, 5s 4d.

Carbolic Acid.—Crystals, minimum price 1s 4d to 1s 7d per lb. delivered in bulk or 40/50-gal. returnable drums. Crude, 60's, 8s per gal. Crystals, 1s 4d to 1s 7d per lb., d/d crude, 8s naked, at works.

Creosote.—Home trade, 1s to 1s. 9d per gal., according to quality, f.o.r. maker's works. MANCHESTER : 1s to 1s 8d per gal.

Cresylic Acid.—Pale 99/99½%, 6s 4d per gal. ; 99.5/100%, 6s 6d per gal. D/d UK in bulk : Pale A.D.F. from 6s 5d per imperial gallon f.o.b. UK, 85 cents per US gallon, c.i.f. NY.

Naphtha.—Solvent, 90/160°, 5s per gal ; heavy, 90/190°, 3s 11d per gal. for bulk 1000-gal. lots, d/d. Drums extra ; higher prices for smaller lots.

Naphthalene.—Crude, 4-ton lots, in buyers' bags, £17 14s to £29 2s per ton nominal, according to m.p. ; hot pressed, £40 18s per ton in bulk ex-works ; refined crystals, £59 10s per ton d/d mis. 4-ton lots.

Pitch.—Medium, soft, home trade, £9 per ton f.o.r. suppliers' works ; export trade about £10 10s per ton f.o.b. suppliers' port.

Pyridine.—90/160, 20/- to £1 2s 6d per gal.

Toluole.—Pure, 5s 7d ; 90's 4s 10d per gal. d/d. MANCHESTER : Pure, 5s 7d per gal. naked.

Xylole.—For 1000-gal. lots, 5s 10d to 6s per gal., according to grade, d/d London area in bulk.

Intermediates & Dyes
(Prices Nominal)

***m*-Cresol 98/100%.**—4s 9d per lb. d/d.

***o*-Cresol 30/31° C.**—1s per lb. d/d.

***p*-Cresol 34/35° C.**—4s 9d per lb. d/d.

Dichloraniline.—4s 3½d per lb.

Dinitrobenzene.—88/99° C., 2s per lb.

Dinitrotoluene.— S.P. 15° C., 2s 0½d per lb. ; S.P. 26° C., 1s 4d per lb. ; S.P. 33° C., 1s 2d per lb. ; S.P. 66/68° C., 1s 10d per lb. Drums extra.

***p*-Nitraniline.**—4s 10d per lb.

Nitrobenzene.—Spot, 9½d per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—2s 4d per lb.

***o*-Toluidine.**—1s 10d per lb., in 8/10-cwt. drums, drums extra.

***p*-Toluidine.**—5s 9½d per lb., in casks.

Dimethylaniline.—3s 3d per lb., drums extra, carriage paid.

Publications & Announcements

POLLUTION of the atmosphere by grit and dust has increased in this country during the last 15 years says 'The Investigation of Atmospheric Pollution' published by HM Stationery Office for DSIR (price 7s 6d, by post 7s 10d). On the other hand there has been a small decrease in pollution by smoke and oxides of sulphur. This publication is described as a report on observations in the 10 years ending 31 March 1954 and summarizes the conclusions derived from the results of about 1,500,000 individual measurements. In many densely populated industrial areas, says the report, the amount of pollution may be as much as 40 times that in rural areas; and at times of smog the average level of pollution by smoke and sulphur may reach 10 times the normal for the same time of year. Local authorities and other organizations who co-operate with the Fuel Research Station, Greenwich, of DSIR, were responsible for making the measurements. In the 10 years under review the number of such organizations has increased from 80 to 220 and the number of measuring instruments in regular use has increased from 200 to 1,500. The number at present is about 2,000. A monthly bulletin of results is issued to all co-operating organizations. As the result of the interest that is being shown in this problem these bulletins are now summarized and published. The report also includes descriptions of the important investigations by the Research Station on methods of reducing air pollution. Equipment has been devised for avoiding smoke emission from hand fired boilers and many boilers have been equipped with it. The removal of oxides of sulphur from flue gas, production of coke that will give a satisfactory fire even on an old fashioned fire grate, and the testing of domestic heating equipment are also described.

* * *

TWO technical booklets have recently been issued by the M. W. Kellogg Company, 225 Broadway, New York 7, NY. The first of these 'Low Cost Production of 95 Octane Clear Reformate' describes the Kellogg naphtha reforming process which uses the Sinclair-Baker platinum catalyst RD-150 for the production of high-octane reformates. The RD-150 catalyst can be regenerated quickly and easily to provide many operating cycles each of many months' duration with negligible losses in catalyst activity. In a typical installation it is said that this catalyst has been in operation for a year without supplementing. The second booklet is called 'Better Yields, Higher Purity from Ethylene Plants' and it gives facts and figures concerning a steam pyrolysis process which allows the refiner to dispose of marginal products by economically converting natural gasoline, residuals or other low value materials to ethylene or olefines. Excellent yields of high quality olefines are claimed for this process, in most instances higher than can be obtained by conventional cracking. The process is also said to have a high on-stream efficiency. The booklet covers typical yields from the steam cracking of ethane and propane, includes a flow chart and process description of the steam pyrolysis design and features an overall economic summary of the operating plant.

* * *

LATEST edition (November) of the *Hilger Journal* published by Hilger & Watts Ltd., 98 St. Pancras Way, London NW1, contains an article on direct reading analysis with the medium quartz spectrograph. The most important single source of errors in direct reading spectroscopy says the article is almost always the sampling technique. The preparation of homogeneous samples is sometimes a matter of difficulty. Generally speaking the best samples are chill-cast discs which are sparked on the plane surface after their skin has been removed by turning in a lathe. Also just published is a booklet 'Hilger Scientific Instruments 1875-1955'. This reviews the history of the company since its formation by Adam Hilger in 1875. The most important product of the firm in those days was stellar spectroscopes and the first order book contains many orders for these instruments. In 1904 the company was incorporated as Adam Hilger Ltd. with Mr. Frank Twyman as managing director, and in 1948 it amalgamated with E. R. Watts & Son Ltd. to form the present company. Since the war additions have been made to the Camden Town factory and a large factory has been built at Debden in Essex.

Chemical & Allied Stocks & Shares

THERE has been a fairly steady undertone in stock markets, though holiday influences naturally restricted business and in addition there was also the counter-attraction of the Consett Iron and other new issues. There seems little doubt that higher dividend announcements from well-known companies, including Turner & Newall, Colvilles and Stewarts & Lloyds, helped sentiment a good deal because they have indicated that if profits move higher, the tendency will be for dividends to be increased.

Caution May Continue

A few weeks ago it was being argued that the higher profits tax and the more competitive conditions in home and export markets might make companies reluctant to pay more. It is realised, of course, that it is still very difficult to judge whether the credit squeeze and the other measures are checking inflation sufficiently, and whether further measures such as a higher bank rate, are in prospect. In fact, it is being suggested that markets are likely to remain cautious, possibly until the April Budget.

Chemical shares have participated in the better trend in stock markets. The acquisition of Marchon Products by Albright & Wilson, and other developments as well, have emphasized that the chemical industry has a lot of scope for expansion and development. Imperial Chemical have been quite well maintained on balance at 47s 4½d, compared with 47s 1½d. Albright & Wilson 5s shares moved up from 19s 1½d to 20s 10½d and Fisons advanced to 56s 3d, which compares with 55s 9d a month ago.

Laporte 5s units moved up from 16s. 1½d to 17s 10½d and higher dividend hopes kept Reichhold 5s shares active; they moved up on the month from 19s 3d to 20s 3d. Elsewhere, Monsanto were higher, there 5s units having risen from 27s to 27s 6d. Brotherton 10s shares remained at 36s 3d. Buyers remained in evidence for Hardman & Holden 5s shares, which were 13s 3d, compared with 12s 9d a month ago, while Hickson & Welch 10s shares rose from 28s to 30s.

William Blythe 3s shares were quoted at 15s. British Chrome Chemicals 5s shares rose from 11s 3d a month ago to 13s 6d. Ashe Chemical 1s shares were around 1s 6d and F. W. Berk 5s shares 8s 4½d, a rise of 1s on the month. Boake Roberts 5s shares rose to 15s 9d. Coalite & Chemical 2s shares again changed hands around 4s, while in other directions Lawes' Chemical strengthened to 15s 10½d. Yorkshire Dyeware & Chemical eased from 11s 3d to 10s 9d. Willows Frances 2s 6d. shares eased from 4s 7½d a month ago to 4s 4½d.

Under the influence of the higher dividend, Turner & Newall advanced on the month from 102s to 110s 6d. Unilever were 72s 6d 'ex' the free scrip issue, while in other directions, the 6s 8d units of the Distillers Co. were 23s 6d 'ex' the maintained interim dividend. Borax Consolidated remained prominently active and advanced to the new high level of 160s before easing to 159s, which compared with 153s 9d a month ago. The company's latest progress report emphasized the long-sighted policy being followed, which should add considerably to earnings as time proceeds.

British Glues 4s shares strengthened from 15s 9d to 16s. British Xylonite eased from 43s 3d to 42s 6d. Bakelite were 33s 6d, compared with 32s 6d a month ago, and British Industrial Plastics 2s shares moved up from 6s 1½d to 6s 7½d. In other directions Staveley were 68s compared with 61s 9d a month ago. British Aluminium advanced from 47s 9d to 52s 6d on higher dividend hopes. Oils displayed considerable activity but fluctuated sharply, the unchanged Shell interim dividend coming as a disappointment in view of the higher profits reported. Shell were however 141s 6d, compared with 135s 7½d a month ago but BP receded to 106s 10½d, compared with 108s 9d. There has been revived talk of a possible free scrip issue from Shell early next year.

Plastics From Castor Seed Oil

Details of a new plastic, Rilsan, to be manufactured by the newly formed Organico Co. were given to shareholders of Société d'Exploitations et d'Interêts Chimiques et Metallurgiques (Seichime) by M. Raoul de Vitry, the chairman, in Paris recently. The basis of Rilsan will be the oil extracted from castor seeds.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

COASTAL PAINTS LTD., London, EC.—29 November, debentured to Barclays Bank Ltd. securing all moneys due or to become due to the Bank; general charge. *Nil. 19 April 1955.

COLBY PRODUCTS LTD.—London NW, manufacturers of scientific appliances &c.—25 November, charge, to Midland Bank Ltd. securing any indebtedness or liability absolute or contingent to the Bank of Rallie Health Appliances (Mfg.) Ltd., Rallie Health Appliances (Export) Ltd., Rallie Health Appliances Ltd., Blunden Surgical Appliance Co. Ltd., William S. Rice Ltd., W. A. Collings Ltd. & Compri-Vena (1937) Ltd.; charged on certain moneys. *Nil. 31 December 1954.

Satisfaction

AVON ALUMINIUM CO. LTD., Caldicot.—Satisfaction, 21 November, of charge registered 8 August, 1946.

Changes of Name

J.H.D. LTD., manufacturers of soaps etc., Waterside Soap Works, Halifax, changed to J. H. Dyson & Son Ltd., on 4 November, 1955.

BRITISH RECOVERED RUBBER & CHEMICAL CO. LTD., 544 Ashton New Road, Clayton, Manchester 11, changed to BRR (Clayton) Ltd., on 28 November.

BRR (PROPERTIES) LTD., 544 Ashton New Road, Clayton, Manchester 11, changed to British Recovered Rubber & Chemical Co. Ltd., on 28 November.

Increases of Capital

GEL CHEMICALS LTD., 11 Ironmonger Lane, London EC2, increased by £900, in £1 ordinary shares, beyond the registered capital of £100.

F. W. DOCKS & COMPANY LTD., manufacturers of cosmetics, perfumes and toilet preparations etc., 23 Wellesley Road, Croydon, Surrey, increased by £2,500 in £1 ordinary shares, beyond the registered capital of £10,000.

NORMAN EVANS & RAIS LTD., colour & chemical manufacturers etc., Dudley Road, Manchester 16, increased by £15,000 in £1 shares, beyond the registered capital of £70,000.

New Registrations

Gosmore Products Ltd.

Private company (558,755). Capital £100 in £1 shares. To act as agents, factors and manufacturers in relation to specialized technical compositions for the building and allied industries, paints, sealers and piping compounds etc. Directors: George W. Dallison and Mrs. Audrey B. Dallison, 14 Camlet Way, Hadley Wood, Herts. Reg. office: 182 Church Hill Road, East Barnet, Herts.

Norman Dawson (Chemicals) Ltd.

Private company (558,799). Capital £10,000 in £1 shares. To carry on the business of industrial chemists etc. Directors: Norman Dawson and Dudley F. M. Appleby. Reg. office: 66 Wingrove Road, Newcastle-on-Tyne.

BB Chemical Co. (Ireland) Ltd.

Private company. (15,772). Registered in Dublin. Capital £1,000. To carry on the business of manufacturers of and dealers in blacking, inks, stains, dyes, dressings etc. Subscribers: Miss Mary Sheehy and Iris Emmett, 42-3 St. Stephen's Green, Dublin, Eire.

Squibb (Ireland) Ltd.

Private company (15,797.) Registered in Dublin. Capital £70,000. To carry on the business of manufacturers of all kinds of drugs, medicinal products, chemicals etc. Subscribers (each with one share): Pauline T. Dunne and Noel R. Scully, 56 Lower O'Connell Street, Dublin.

United Chemicals (Ulster) Ltd.

Private company. (NI 3611). Registered in Belfast 24 November. Capital £5,000 in £1 shares. Objects: To carry on the business of manufacturers of drugs, pharmaceutical, antibiotic, biological, glandular and medicinal products etc. The subscribers (each with one share) are: Nellie Morrow, 18 East Bridge Street, Enniskillen, clerk, and Mable Elliott, 18 East Bridge Street, Enniskillen, clerk. The first directors are not named.

Company News

The Shawinigan Water & Power Co.

The directors of The Shawinigan Water & Power Co. have declared a special dividend of 25 cents per share on the no par value common shares of the company, payable 30 December to shareholders of record 2 December. In addition, a dividend of 45 cents was declared on the no par value common shares of the company for the quarter ending 31 December 1955, payable 24 February 1956, to shareholders on record 13 January. The previous quarterly dividend rate was 30 cents per share, which has been in effect at that rate since 1946. In addition, a special dividend of 25 cents per share has been paid each December since 1950, making the annual total $1.45 per share.

Allen & Hanburys Ltd.

At the 63rd ordinary general meeting of Allen & Hanburys Ltd., held in London on 19 December, Mr. J. C. Hanbury, M.A., B.Pharm., F.P.S., F.R.I.C., the chairman, said that the home sales, pharmaceutical and surgical, of the parent company showed an increase of approximately five per cent over the previous year. During the year work progressed on the sterile products building at Ware, Herts, and indications were that it will be in production before the end of 1956. The profit of the company for the year, after taxation, was £105,429, as against £71,019 last year. The group profit totalled £134,572 as against £81,805 last year. A total distribution of 17½ per cent on the ordinary shares was approved.

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CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

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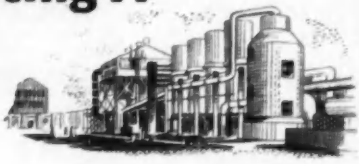

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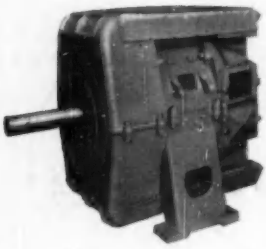

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